

Survey of Wells and Stream Gages in the Black Mountains Area, California Wash Basin, Coyote Spring Valley, Garnet Valley, Hidden Valley and the Muddy River Springs Area, Nevada

by

Southern Nevada Water Authority

May 2003

<b>Survey of Wells</b>	and Stream	Gages in the	e Black I	Mountains	Area, (	California	Wash	Basin
Coyote Spring	Valley, Gar	net Valley, l	Hidden V	Valley, and	Muddy	y River Sp	rings A	<b>Area</b>

By

Southern Nevada Water Authority/Las Vegas Valley Water District

## **Project Team:**

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**Survey Team:** 

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#### **May 2003**

Front cover picture insets: Top, GPS data collection on well BM-ONCO2 (May 24, 2002) in the Black Mountains Area; Bottom from left: Surface water flume at the LDS Gage site (October 10, 2002) in the Muddy Springs Area; and GPS data collection at Well MX-4 (May 21, 2002) in Coyote Spring Valley. Background picture of Jackass Spring (looking Northeast) in Muddy River Springs Area (July 2001).

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PAIUTES-ECP-3	
PAIUTES-M1	
PAIUTES-M2	
PAIUTES-M3	

PAIUTES-TH2	
Coyote Spring Valley	
CE-VF-1	
CE-VF-2	
CSV-3	
DV-1	
MX-4	
MX-5	
CSV-RW2	
Garnet Valley	
GARNET WELL	
GV-1	
GV-2	
GV-MIRANT1	
GV-PW-MW-1	
GV-PW-MW-2	
GV-PW-WS1	
GV-RW-1	
Hidden Valley	
SHV-1	
Muddy River Springs Area	
ABBOTT	
BEHMER MW	
CSV-1	
CSV-2	
EH-4	
EH-5B	
IVERSON FLUME	
LDS CENTRAL	
LDS EAST	
LDS GAGE	
LDS WEST	
LEWIS 1 OLD	
LEWIS 2M	
LEWIS NORTH	
LEWIS SOUTH	
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#### Introduction

The importance of accurate ground-water elevations in determining ground-water contours and flow directions has long been recognized. It assumes an even greater importance when ground-water studies are conducted on a regional basis by different organizations. The difficulty in the interpretation of ground-water level data has been the uncertainty in the land surface elevation. Currently there are at least five organizations involved in the collection of surface water and ground-water level data in the on-going investigation of the regional carbonate system within the White River and Lower Meadow Valley Wash Flow Systems. In order to obtain a common reference point for water level measurements, a detailed location and elevation survey of about fifty wells and stream gages belonging to various entities and individuals (including the Southern Nevada Water Authority/Las Vegas Valley Water District (SNWA/LVVWD)) in the Black Mountains Area, California Wash Basin, Coyote Spring Valley, Garnet Valley, Hidden Valley, and the Muddy River Springs Area was undertaken during the months of May, June and July 2002. The locations of wells and stream gages surveyed are shown in Figure 1.

The survey also meets a component of SNWA's obligation under an agreement signed in July 2001 between the SNWA and the Federal Bureaus (National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), and the U.S. Bureau of Land Management (BLM)) regarding monitoring, management and mitigation of SNWA/LVVWD's current and future ground water rights in Coyote Spring Valley. The survey was performed under the supervision of the LVVWD's state of Nevada registered professional land surveyor. The list of wells and stream gages surveyed and their respective ground-water basins are given in Table 1.

The survey results are reported using the most standard datum available. To ensure reproducibility, all the parameters listed below were utilized in the survey.

#### Methodology

Static surveying techniques were used in acquiring location and elevation data. The technique involves the use of a global positioning system (GPS) in the acquisition of data for a minimum of two hours. Most of the occupations in this study exceeded the two-hour minimum during the survey.

#### **Measurement Point**

Elevation measurements were generally made at known depth to water measurement points (DTW MPs) but this was not possible in all cases. The survey measurement points (SMPs) therefore, may or may not be the same points used to acquire sub-surface water levels. The survey measurement points (SMPs) have been adequately described in Table 2 and also on the pictures in Appendix A. Attention must be paid to the SMP information to determine the type of adjustment that should be made during any future survey or determination of ground-water altitude. For survey measurements made at the known DTWMPs, ground-water altitude can be obtained by subtracting the depth to water measurement (DTWM) from the survey measurement point elevation (SMP) elevation (i.e. SMP – DTWM; Figure 2a). For SMP elevation measurement made below the MP, (Figure 2b), ground water altitude is obtained by adding the

Figure 1

Table 1: Location and list of wells and stream gages surveyed for the project in May/June 2002.

Site Name	Alias	Hydrographic Basin
BM-DL-1	Apex-1	Black Mountains Area
BM-DL-2	Apex-2	Black Mountains Area
BM-ONCO -1	ONCO-1	Black Mountains Area
BM-ONCO-2	ONCO-2	Black Mountains Area
PAIUTES-ECP-1	ECP-1	California Wash
PAIUTES-ECP-2	ECP-2	California Wash
PAIUTES-ECP-3	ECP-3	California Wash
PAIUTES-M-1	M-1	California Wash
PAIUTES-M-2	M-2	California Wash
PAIUTES-M-3	M-3	California Wash
PAIUTES-TH-2	TH-2	California Wash
CE-VF-1	365232114554401	Coyote Spring Valley
CE-VF-2	365227114554401	Coyote Spring Valley
CSV- RW2	NPC-CSV	Coyote Spring Valley
CSV-3	364127114553001	Coyote Spring Valley
DF-1	Dutch Flat-1 365008114541101	Coyote Spring Valley
MX-4	CE-DT-4; 364743114533101	Coyote Spring Valley
MX-5	CE-DT-5; 364741114532801	Coyote Spring Valley
GARNET WELL	,	Garnet Valley
GV-1		Garnet Valley
GV-2		Garnet Valley
GV-MIRANT1		Garnet Valley
GV-PW-MW1	Pinnacle MW-1	Garnet Valley
GV-PW-MW2	Pinnacle MW-2	Garnet Valley
GV-RW1	NPC-Harvey Well Replacement	Garnet Valley
SHV-1	363308114553001	Hidden Valley
ABBOTT	UM7	Muddy River Springs Area
BEHMER-MW	Behmer Monitoring Well	Muddy River Springs Area
CSV-1	364601114514301	Muddy River Springs Area
CSV-2	364650114432001	Muddy River Springs Area
EH-4		Muddy River Springs Area
EH-5B		Muddy River Springs Area
IVERSON FLUME	09415927	Muddy River Springs Area
LDS CENTRAL	UM49	Muddy River Springs Area
LDS EAST	UM50	Muddy River Springs Area
LDS WEST	UM18	Muddy River Springs Area
LEWIS 1 OLD	NPC Old; UM55	Muddy River Springs Area
LEWIS 2M	UM74 - Lewis 2 monitoring well	Muddy River Springs Area
LEWIS NORTH	UM45	Muddy River Springs Area
LEWIS SOUTH	UM43	Muddy River Springs Area
MUDDY SPRING GAGE AT LDS FARM	09415900	Muddy River Springs Area
MX-6	CE-DT-6; 364604114471301	Muddy River Springs Area
PEDERSON EAST GAGE	Playboy Pool Gage; 09415908	Muddy River Springs Area
PERDERSON SPRING GAGE	09415910	Muddy River Springs Area
PERKINS OLD	UM15	Muddy River Springs Area
WARM SPRINGS WEST GAGE	09415920	Muddy River Springs Area

# Table 2

height of casing above SMP to the SMP elevation and then subtracting the DTWM (i.e. SMP + the height of casing above SMP – DTWM).

Photographs taken at the measurement sites during the survey depicting the locations of surveyed measurement points are given in Appendix A.

#### Horizontal Datum

The North American Datum of 1983 (NAD83), which employs the use of the Geodetic Reference System 1980 for ellipsoidal orientation (see *Ellipsoid* below) was used as the horizontal datum.

#### Vertical Datum

The vertical datum is the North American Vertical Datum of 1988 (NAVD88). It consists of three elements; Datum, Ellipsoid & Geoid model. To obtain similar results for any future surveys, all three elements for this datum must be maintained.

#### **Ellipsoid**

The ellipsoid used to measure these points is the Geodetic Reference System of 1980 (GRS 1980). The semi-major and semi-minor axes for this ellipsoid directly conform to the World Geodetic System 1984 (WGS '84).

#### Geoid Model

Adjustments for the undulating effects of gravity due to unevenly distributed mass (e.g. high-mass rock vs. low-mass alluvium) were made using bi-quadratic interpolation using the International GPS Service (IGS) Geoid 1999 (Geoid '99).

#### Results

#### Precise Ephemeris

The best available ephemeris IGS was used to adjust the data. The IGS tracks United States Navigation Satellites with Timing and Ranging (NAVSTAR) constellation GPS satellites and provides the most accurate satellite-by-satellite trajectory information available. The IGS works in conjunction with NASA on these calculations. By comparison, real-time kinematics (RTK) uses the last 24-hours satellite tracking information to estimate the satellite trajectory used in the broadcast ephemeris. The drawback to using this more precise ephemeris is that the IGS does not release these data until two weeks after collection or compilation mainly for defense purposes.

# Scenario (a)

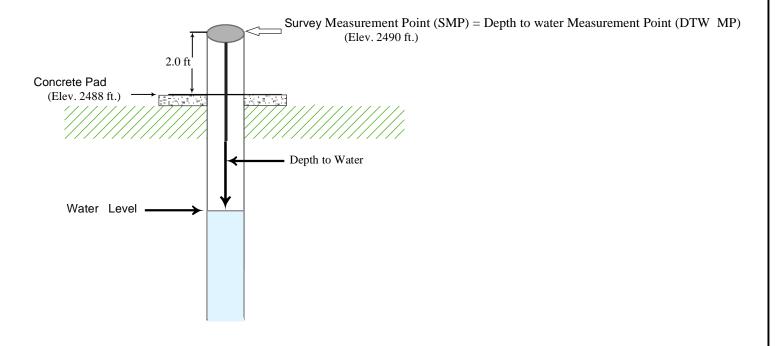


Figure 2a. Survey Measurement Point = Depth to Water Measurement Point (DTW MP) Ground Water Altitude = SMP (2490 ft) - depth to water

# Scenario (b)

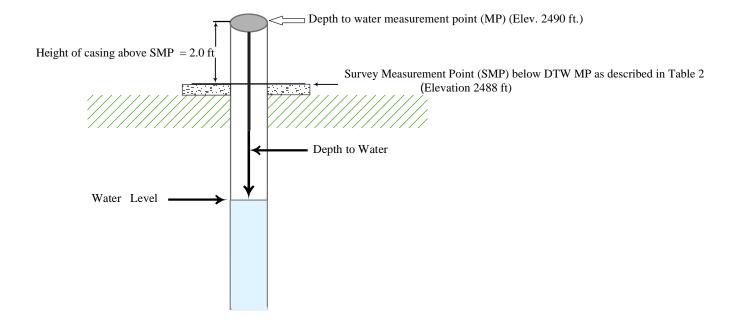


Figure 2b. Survey Measurement Point (SMP) is below depth to water measurement point (DTW MP) Ground Water Altitude = SMP elevation (2488) + height of casing above SMP (2 ft) - depth to water

#### Adjustment Agency

The results of the survey were calculated and adjusted by the National Geodetic Survey's (NGS') "On-line Positioning User Service" (OPUS). The OPUS is a service provided by the NGS as an on-line adjustment service for geodetic-grade spatial positioning solutions (http://www.ngs.noaa.gov/OPUS/index.html). The minimum service adjusted by OPUS and the NGS is a two-hour static observation. The results thereof were processed using Continually Operating Reference Stations (CORS) at a minimum occupation time of two hours. The accuracy of the system is observation-site dependent.

The NGS-OPUS solution is attached as Appendix B. The final position was calculated using NGS' PAGES program that provides a variance/covariance matrix solution employing a Least Squares adjustment to the final baseline. This adjustment is superior to most vendor-based solution software. Error estimates have also been calculated using statistical parameters observed during the survey, and are shown in Table 2. Errors in vertical elevation range from 0.082 to 0.371 of a foot.

Temporary reference points have been established for each of the wells to provide a reference point to re-establish the MP elevation should the MP (which is usually the top of casing) be modified. The temporary reference points survey data are given in Table 3.

#### Well Logs

Well logs of the wells surveyed are included in Appendix A. Copies of the original well logs submitted by drillers to the Nevada Division of Water Resources (NDWR) and electronic copies from the NDWR website were used in most cases. In some other instances, copies from other publications (e.g. drilling and monitoring reports) have been used and are appropriately credited.

#### **Additional Work**

Additional elevation surveys will be conducted on wells without elevation control as monitoring efforts are adjusted or additional wells are drilled. When additional surveys are completed, the individual survey results will be forwarded to report holders for incorporation into this report without re-issuing the entire report. All inquiries regarding SNWA/LVVWD surveys or updates should be submitted in writing to SNWA Resources Department, Water Resources Division, 1900 E. Flamingo Road, Suite 180, Las Vegas, NV 89119.

Table 3

Table 3 (continued)

#### References

Berger, D.L., Kilroy, K.C., and Schaefer, D.H., 1988, Geophysical logs and hydrologic data for eight wells in the Coyote Spring Valley area, Clark and Lincoln Counties, Nevada: U.S. Geological Survey Open-File Report 87-679, 59 p.

Converse Consultants, 2002, Ground water level monitoring program – 2001 annual report, Moapa, Nevada, *prepared for* Nevada Power Company, 80 p.

Desert Research Institute, 1986, Summary of deep drilling activities at NPC Reid Gardner facility, Clark County, Nevada, *John W. Hess*, Project Manager, October 1985 – May 1986, 26 p.

http://water.nv.gov/IS/wlog/wlog.htm Nevada Division of Water Resources well log database.

http://www.ngs.noaa.gov/OPUS/index.html On-line Positioning User Service.

Mifflin and Associates, Inc., 2001, Hydrogeologic and ground water modeling analyses for the Moapa Paiute Energy Center, A Calpine Company Project in cooperation with the Moapa Band of Paiute Indians, 218 p.

# Acknowledgement

We thank Jason Dixon and Martin Mifflin of Converse Consultants and Mifflin and Associates, Inc. respectively for their help in the field, and also providing access to the Nevada Power Company wells in Moapa and the Paiute Indians wells in the California Wash Basin. We acknowledge the help of R. J. Johnson, a consulting geologist, for providing information and access to the Onco wells in the Black Mountains Area.

# APPENDIX A

PHOTOGRAPHS OF SURVEYED SITES, AND LOGS OF SURVEYED WELLS

# List of wells in Black Mountains Area

Site Name	Alias	Owner
BM-DL-1	Apex-1	Dry Lake Water LLC
BM-DL-2	Apex-2	Dry Lake Water LLC
BM-ONCO -1	ONCO-1	SNWA
BM-ONCO-2	ONCO-2	SNWA



Survey measurement point at top of 2" access port east of big casing at DTWMP

GPS setup at BM-DL-1 (Apex-1) in the Black Mountains Area (Well has since been fenced)

WHITE-DIVISION OF WATER RESOURCES CANARY-CLIENT'S COPY PINK-WELL DRILLER'S COPY

PRINT OR TYPE ONLY

# STATE OF NEVADA

## DIVISION OF WATER RESOURCES

## WELL DRILLER'S REPORT

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DW-	OFFICE USE ONLY
CES	Log No.
RT	Permit NoBasin

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Survey measurement point is the top of 2" access port N. of big well casing at DTW MP

GPS setup at Well BM-DL-2 (Apex-2) in the Black Mountains Area (Well has since been fenced)

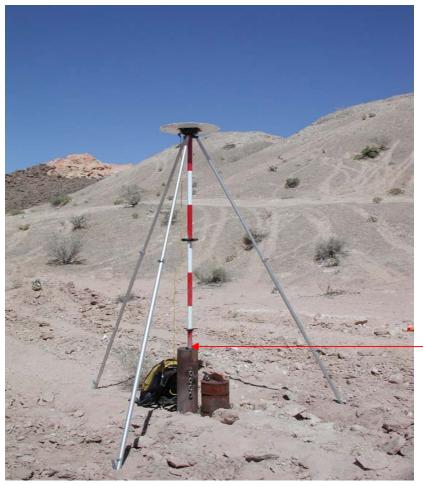
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# WELL DRILLER'S REPORT

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			-		Date				



Survey measurement point is at the top of 2" casing inside vault at the DTW MP

Setup of GPS data gathering station at BM-ONCO-1 (ONCO-1) in the Black Mountains Area

## Nevada Division of Water Resources

# Well Log Database

#### **Query Results**

Type of Site: N

Log No.: 50885

Sequence No.: 27546

Permit No.: 58048

Basin: 215

Notice of Intent#: 15543

Owner: OGLEBAY NORTON CORPORATION Mailing/Well Address: GALE HILLS NV

Location NE SW

Twn: 20S Sec: 08

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Well Construction

Type of Work: N

Proposed Use: K

After Hours Pump:

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Depth to Bedrock:

Hole Depth: 1291 feet

Construction Data Quality: G

Surface Casing Diameter: 2 inches

Lithologic Data Quality: G

Cased To: 1291 feet Casing Reductions: 0

Aquifer Type:

Perforations:

Date Started: 4/26/1995 Date Complete: 5/11/1995

From 440 feet to 1280 feet

Yield G.P.M.

Test Method:

Perforation Length:

Draw Down: Pumping Water Level:

Perforation Intervals: 1 Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: N from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 344.09 ft below LSD

Water Temperature: 75° F

General Remarks:

Contractor Name: GUSTIN CORP

Contractor License Number: 22193

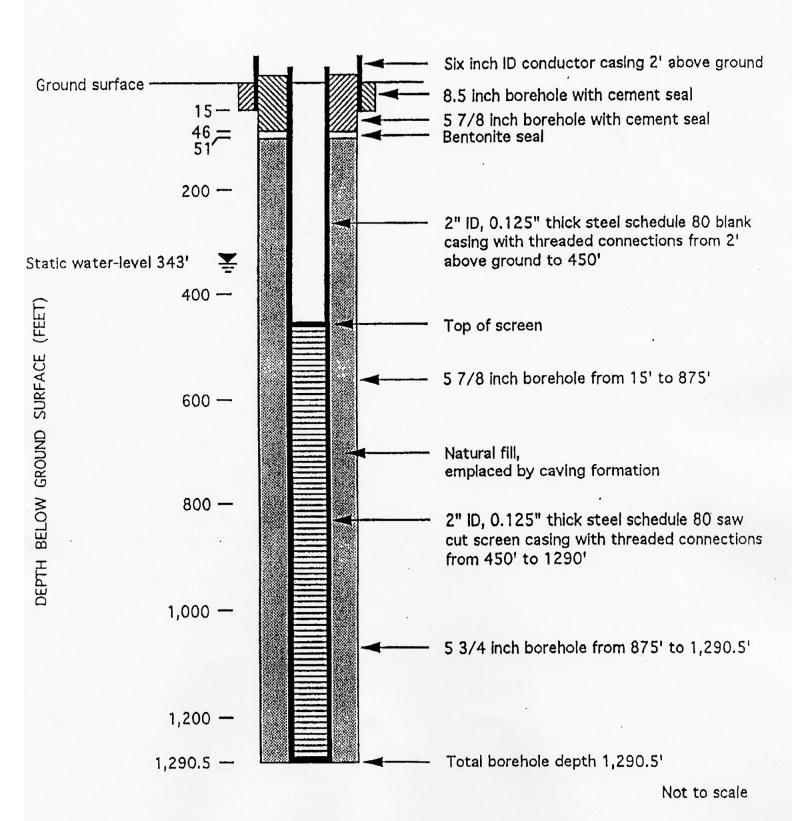
Additional Remarks: Address: P O BOX 894 ELKO NV 89803

Contractor's Drlr No.:

Driller Lic.No.: 1821

Code Definitions

# ONCO-1 GROUND-WATER EXPLORATION WELL GALE HILLS, NEVADA MAY, 1995 MONITOR WELL CONSTRUCTION





Survey measurement point is the top of a 2" casing inside vault at the DTW MP

Gathering GPS data on BM-ONCO-2 (ONCO-2) Well in the Black Mountains Area

#### Nevada Division of Water Resources

#### Well Log Database

#### Query Results

Type of Site: N

Log No.: 50810

Sequence No.: 27471

Permit No.: 58047

Basin: 215

Notice of Intent#: 15544

Owner: OGLEBAY NORTON CORPORATION Mailing/Well Address: GALA HILLS NV

Location SE SW

Sec: 08

Twn: 20S

Rng: 65E

Ref: MD

Surface Casing Diameter: 2 inches

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No .:

Block No.:

Type of Work: N

Proposed Use: K

**Drilling Method R** 

Subdiv. Name:

Source Agency: NV003

Hole Depth: 1575 feet

Cased To: 1570 feet

Perforation Length:

Perforations:

Casing Reductions: 0

From 1445 feet to 1575 feet

Well Construction

Depth to Bedrock:

Construction Data Quality: G

Lithologic Data Quality: G Aquifer Type:

Date Started: 5/11/1995

Date Complete: 5/27/1995

Yield G.P.M.

Draw Down:

After Hours Pump:

Pumping Water Level:

Specific Capacity:

Perforation Intervals: 1

Depth of Seal: 50 feet Gravel Packed: N Test Method: from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 549.55 ft below LSD

Water Temperature: 82° F

General Remarks: Contractor Name: GUSTIN CORP

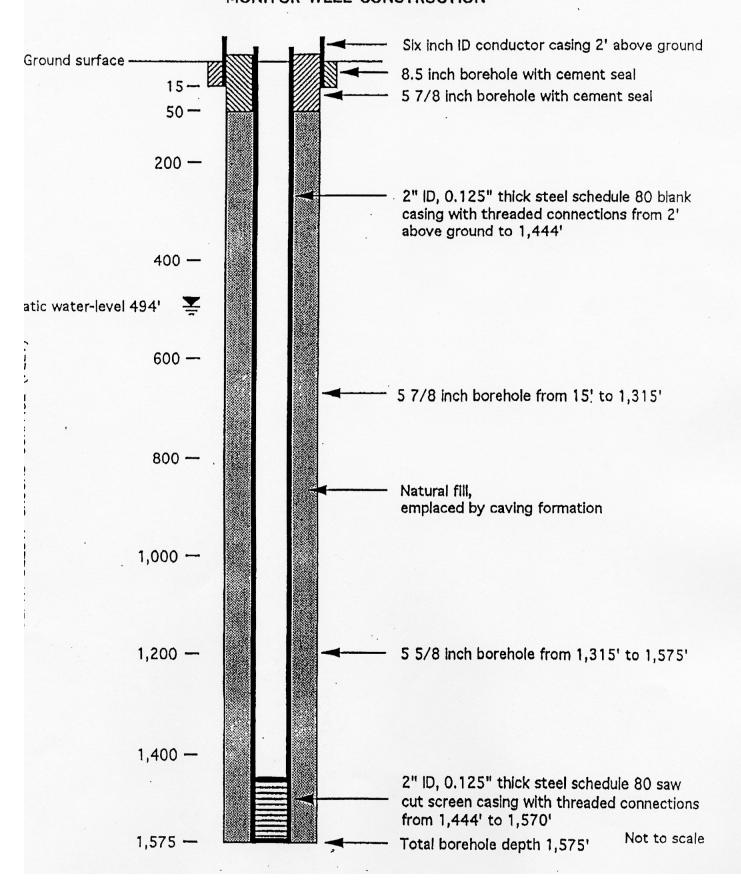
Contractor License Number: 22193 Address: P O BOX 894 ELKO NV 89803

Additional Remarks: Contractor's Drlr No.:

Driller Lic.No.: 1821

**Code Definitions** 

# ONCO-2 GROUND-WATER EXPLORATION WELL GALE HILLS, NEVADA JUNE, 1995 MONITOR WELL CONSTRUCTION



# List of Wells in California Wash Basin

Site Name	Alias	Owner
PAIUTES-ECP-1	ECP-1	Moapa Band of Paiutes
PAIUTES-ECP-2	ECP-2	Moapa Band of Paiutes
PAIUTES-ECP-3	ECP-3	Moapa Band of Paiutes
PAIUTES-M-1	M-1	Moapa Band of Paiutes
PAIUTES-M-2	M-2	Moapa Band of Paiutes
PAIUTES-M-3	M-3	Moapa Band of Paiutes
PAIUTES-TH-2*	TH-2	Moapa Band of Paiutes

<sup>\*</sup> Could not obtain drill log



Survey measurement point is top of well casing inside vault at DTW MP

PAIUTES-ECP-1 WELL (ECP-1) in California Wash prior to setting up a GPS data gathering station

# PRINT OR TYPE ONLY DO NOT WRITE ON BACK

# ECP-1

# DIVISION OF WATER RESOURCES

# WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

Log No	8242	5 \
Permit I Basin	65f	48
NOTICE	OF INTENT	1-8926

	Band of 1				ADDRESS AT WELL LOCATION
MAILING ADDRESS PO	Box 340				ECP-1  *N/S R 64 B Clark County  Subdivision Name
Mo	apa, NV	8902	5		ECP-1
LOCATION SE 1/4	NE 1/4 Se	c. 15	1	6	X <sub>N/S R</sub> 64 <sub>R</sub> Clark Course
PERMIT NO. 65948,	W2092	067-	00-00	1-01	7
		P			
3. WORK PER			4		PROPOSED USE POWER 5. WELL TYPE
New Well ☐ Replace     ☐ Deepen ☐ Abando	n 🗆 Recond	ition		Domestic Municipal	☐ Irrigation
6. LI	THOLOGIC LO	)G			8. WELL CONSTRUCTION
Material	Water Strata	, From	То	Thick- ness	Depth Drilled 1170 Feet Depth Cased 1125 Feet HOLE DIAMETER (BIT SIZE)
see attached s	heet				
					see attached sheet Feet Feet
		-			InchesFeetPeet
					FeetFeet
					CASING SCHEDULE
	-				Size O.D. Weight/Ft. Wall Thickness From To (Inches) (Pounds) (Inches) (Feet) (Feet)
					see attached sheet
					Date according proces
					Perforations: see attached sheet
		-			Type perforation
					Size perforation feet to feet
					From feet to feet
					From feet to feet From feet to feet
					From feet to feet
					Surface Seal: 🖾 Yes 🗆 No Seal Type:
			CNR/		Depth of Seal. 62 Neat Cement
			Receive	3	Placement Method: Dumned & Cement Grout
		1		001	
		1/20	- 4	W. 1	Gravel Packed: Yes 🖺 No
		14	GAS OF	0	From feet to feet
			GAS OF		9. WATER LEVEL 414 feet below land surface
			_		Artesian flow
			="	7-1-2	Water temperature °F Quality
					10. DRILLER'S CERTIFICATION 2
Date started 3	/14/00			10	This well was delited and a second state of the first state of the second state of the
Date completed	***************************************			., 19 ., 19	best of my knowledge
7. W	ELL TEST DA	TA			7227 Hauck Street
TEST METHOD:	☐ Bailer ☐	Pump	☐ Air L	ift	Address Contractor
G.P.M.	Draw Down (Feet Below State	ic)	Time (Hou	ırs)	Las Vegas, NV 89118
	(rece below state				Nevada contractor's license number 4286A
					Nevada driller's license number issued by the 2074
					Division of Water Resources, the on site driller  Signed Reclaid K. Thompson
			ů.		By driller performing actual drilling on site or contractor  Date 3/23/01



wner: Moapa Band of Paiutes

lotice of Intent: 18926

ECP-1



# LITHOLOGIC LOG

MATERIAL	FROM	TO	THICK
calcrete	0	19	19
mudstone	19	158	139
linestone, sandstone, clay	158	167	9
mudstone	167	211	44
limestone	211	360	149
limestone & sandstone	360	400	40
limestone	400	410	10
limestone & sandstone	410	415	5
sandstone	415	435	20
limestone & sandstone	435	470	35
limestone	470	550	80
limestone & siltstone	550	580	30
limestone & sandstone	580	600	20
limestone	600	640	40 .
limestone & dolomite	640	670	30
limestone	670	745	75
siltstone & limestone	745	765	20
sandstone, limestone	765	790	25
nestone, sand & siltstone	790	860	70
nestone	860	905	45
tstone & limestone	905	920	15
limestone	920	995	75
sandstone	995	1010	15
limestone	1010	1030	20
limestone,sand & siltstone	1030	1050	20 .
limestone	1050	1150	100
dolomite & sandstone	1150	1170	20
			0
			0
			0
			0
			0
			0
			0
			0
			0
Market Commence of the Commenc			0
			0
TOTAL		-	1170



# HOLE DIAMETER (BIT SIZE)

INCHES	FROM	то		
26	0	8		
24 1/4	. 8	213.5		
17	213.5	701		
6 5/8	1055	1170		

# CASING/SCREEN SCHEDULE

SIZE (OD)	WALL (IN)	TO	FROM
26		0	.3
18	0.3125	0	600
14	0.3125	600	701
10 3/4	0.25	. 701	1051
6 5/8	0.25	1051	1125

#### PERFORATIONS

TYPE: mill slots

SIZE: 1/8

Γ	OD	FROM	TO
Γ	14	600	701
Γ	10 3/4	701	1051
Г	6 5/8	1051	1125





Survey measurement point is at an "X" at the top of 1.5' casing.

PAIUTES-ECP-2 WELL (ECP-2) in California Wash Basin prior to setting up a GPS data gathering station

#### STATE OF NEVADA

# DIVISION OF WATER RESOURCES

# WELL DRILLER'S REPORT

Log No. 8	142 k	NLY	
Permit No	6594	19	
Ba Q L	i +: 1		
OC. F.O.			

PRINT OR TYPE ONLY					ER'S REP		Ba 2 18	7.1		
DO NOT WRITE ON BACK		accord	ance with	NRS 53	orm in its enti 4.170 and NAC	C 534.340	NOTICE OF IN	18	927	
1. OWNER Band (	of Pa	iutes			ADDRESS A	T WELL LO	OCATION			
MAILING ADDRESS PO BO	x 340									
Moapa	NV	89.02	5	1	ECP-2		01 - mle			
2. LOCATION NE W209	≦¼ Sc 5	1.067-	T	1-017	<b>X</b> /S R	64 E	Clark		County	
PERMIT NO.65949, W209 Issued by Water Reso	urces	1	Parcel No.	×						
	Recond	lition		Domestic		Irrigation	eR 5. □ Test □ Cal □ Stock □ Air	WELL TYPE ble ☒ Rotar	y RVC	
6. LITHOL	OGIC LO	OG			8.		LL CONSTRUCTION		30	
Material	Water Strata	From	To	Thick- ness	Depth Dril		Feet Depth	C4300	39 Feet	
see attached sheet	- Junior				see at	HOLE	DIAMETER (BIT	SIZE) To		
					4	Incl	nesFeet_			
		-			-		nesFeet.			
		-			<del> </del>		nesFeet.		reet	
				(	Size O.D.	Weight/Ft.	ASING SCHEDULI Wall Thickness	E   Prom	То	
•					(Inches)	(Pounds)	(Inches)	(Feet)	(Feet)	
		-		<u> </u>	-	- 4.4 - ab	ad choot			
					see	attach	ed sheet			
					Perforation	s:	n/a			
	-	-			Size pe	erforation				
)					From		feet to	<u> </u>	feet	
							feet to			
					From		feet to		feet	
		-	NROUS Celved 3	-						
-		D	MRO		Surface Se		s 🗆 No	Scal Ty	pe: leat Cement	
		1	Celved 3	1	Depth of S	Method:		⊠ C	ement Grout	
		5	2001	1		Z	Poured	ЦС	oncrete Grout	
		V/		/	Gravel Pac	ked: 🗆 1	es 🖾 No			
		CAS	DEFICE	-	From		feet to		feet	
					9.		WATER LEVEL	/	<b>S</b>	
					10000 10000 10000	er level,		G.P.M.	w and surface	
		-	-	-	1000 State	ow perature				
		-		-	10.		LER'S CERTIFICA	194	9	
Date started 4/18/	0.0				This well	was drilled un	nder my supervision		t is true to the	
Date started 4/18/ Date completed 12/6/0				, 19 , 19	Il ocat of mi	knowledge.	n-4114na	Co I	nc	
	TEST DA			., .,	Mama	'nompso	n Drilling	CO., 1		
TEST METHOD: □ B		☐ Pump	☐ Air I	ift	Address	7227 Ha	uck Street			
1 1 1	Draw Down t Below Str	1	Time (Ho			Las Veg	as, NV 89	118		
- (100	L DEION Su	itic)			Nevada co	ontractor's lic	ense number	4286	5A	
					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	원래, 내가 살아보는 경기 없는 경기를 받는 것이다.	ontractor's Board,			
					Nevada di Divisio	riller's license n of Water Re	number issued by t sources, the on-site			
					0.0000000000000000000000000000000000000	Terl	performing actual drilli	Loms.	un	
		_			Date	**************************************	23/01			

# Page 2 of 2

Owner: Moapa Band of Paiutes

Notice of Intent: 18927

## ECP-2

# LITHOLOGIC LOG

MATERIAL	FROM	TO	THICK
calcrete	0	10	10
mudstone .	10	95	85
limestone & mudstone	95	118	23
limestone & sandstone	118	230	112
limestone	230	350	120
limestone & mudstone	350	380	30
limestone & sandstone	380	420	40
limestone	420	480	60
limestone & sandstone	480	500	20
lime,sand & mud stone	500	600	100
sandstone, limestone	600	620	20
limestone, sandstone	620	680	60
sand,lime & silt stone	680	715	35
limestone	715	795	80
sandstone, limestone	795	815	20
limestone	815	860	45
siltstone, limestone	860	875	15
dolomite	875	905	30
limestone & dolomite	905	930	25
limestone	930	980	50
lime,sand & silt stone	980	1000	20
limestone	1000	1145	145
sand, silt & lime stone	1145	1205	60
sandstone, dolomite	1205	1215	10
limestone & dolomite	1215	1228	13 .
			0
			0
			0
		- F	0
		3.5	0
			0
			0
			0
			0
			0
			0
			0
			0
TOTAL			1228

# HOLE DIAMETER (BIT SIZE)

INCHES	FROM	TO		
24	0	140		
12	140	515		
8.5	515	. 695		
7 7/8	695	1228		

# CASING/SCREEN SCHEDULE

SIZE (OD)	WALL (IN)	то	FROM
18	0.3125	+.5	139
		ucces voca	





Survey measurement point is an 'X' on 1' diameter casing

PAIUTES-ECP-3 WELL (ECP-3) in California Wash prior to setting up a GPS data gathering station

PINK-WELL DRILLER'S COPY

DO NOT WRITE ON BACK

PRINT OR TYPE ONLY

# DIVISION OF WATER RESOURCES

# WELL DRILLER'S REPORT

Please complete this form in its entirety in

Log No. 8245	
Permit No 6 6	473
Basin Q \8	

19991

1. OWNER	Moapa Ban	d of P				ADDRESS AT WELL LOCATION  ECP-3
MAILING ADD	RESS PO BO	x 340			ECP-3	
	Moapa	, NV	8902	25		
2. LOCATION PERMIT NO	NE W210	E¼ Sec	067-	00-00	16 1-01	NS R 64 E Clark County Subdivision Name
	Issued by Water Res	ources		Parcel No.		Subdivision Name
3. New Well	Replace	MED □ Recondi	tion	4.	Domestic	PROPOSED USE POWER 5. WELL TYPE  Irrigation Test Cable Rotary RVC  Il/Industrial Monitor Stock Air Other
6.		OGIC LO				
· M	aterial	Water Strata	From	To	Thick- ness	Depth Drilled Feet Depth Cased Feet
see atta	ched sheet					HOLE DIAMETER (BIT SIZE)  see attached sheet To  Inches Feet Feet
					-	InchesFeetFeet
				-		FeetFeet
						CASING SCHEDULE
						Size O.D. Weight/Ft. Wall Thickness From To (Inches) (Pounds) (Inches) (Feet) (Feet)
						see attached sheet
					-	Perforations: n/a Type perforation
						Size perforation
					100	From feet to feet
						Fromfeet tofeet
						From feet to feet From feet to feet
						From feet to feet
					THE VIEW	Surface Seal: Yes Yo Seal Type:
						Depth of Seal Neat Cement
			10	NR/O	<u></u>	Placement Method: Pumped Cement Grout
			/	Received	5/	☐ Poured ☐ Concrete Grout
			-	200000000000000000000000000000000000000		Gravel Packed: Yes 🖺 No
			15	200	4.1	Fromfeet tofeet
	-		Part	AS OF	9	9. WATER LEVEL 429 feet below land surface
				100		Static water level. 429 feet below land surface Artesian flow. G.P.M. P.S.I.
						Water temperature°F Quality
						10. DRILLER'S CERTIFICATION
Date started	8/29/00 10/3/00				., 19	
Date completed					., 19	NameINOMPSOIT DITITING CO. INC.
7. TEST M	WELL THOD: Ba	iler	A Pump	☐ Air L	ift	Address 7227 Hauck STreet
WAS 32 14 CD		raw Down Below Static	1	Time (Hou		Las Vegas, NV 89118
			-			Nevada contractor's license number 4286A issued by the State Contractor's Board.
						Nevada driller's license number issued by the 2074 Division of Water Resources, the on-site driller
)					,*	Signed By driller performing actual drilling on site of contractor
					1	Date 3/23/01

# Page 2 of 2

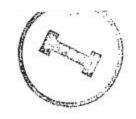
Owner: Moapa Band of Paiutes

Notice of Intent: 19991

# ECP-3

# LITHOLOGIC LOG

MATERIAL	FROM	TO	THICK
calcrete & alluvium	0	20	20
mudstone	20	40	20
sandstone & limestone	40	60	20
limestone	60	70	10
limestone & sandstone	70	100	30
limestone	100	140	40
siltstone	140	170	30
sandstone	170	220	50
limestone	220	240 .	20
sandstone,limestone	240	340	100
limestone	340	415	75
siltstone & limestone	415	535	120
limestone	535	570	35
sandstone	570	610	40 ·
limestone	610	670	60
sandstone	670	685	15
dolomite, sandstone	685	690	5
lime,sand &silt stone	690	740	50
sandstone,siltstone	740	785	45
sandstone	785	790	5
limestone & sandstone	790	805	15
dolomite	805	810	5
sandstone & limestone	810	845	35
limestone & siltstone	845	855	10
siltstone, sandstone	855	880	25
limestone	880	935	55
sandstone, dolomite	935	950	15
lime, sand & silt stone	950	1055	105
limestone -	1055	1120	65
lime,sand &silt stone	1120	1150	30
dolomite	1150	1175	25
limestone, sandstone	1175	1200	25
limestone, siltstone	1200	1220	20
limestone	1220	1255	35
siltstone	1255	1260	5
limestone	1260	1445	185
siltstone	1445	1450	5
limestone, dolomite	1450	1480	30
limestone	1480	1500	20
TOTA	L		1500



# HOLE DIAMETER (BIT SIZE)

INCHES	FROM	TO
12	0	80
8 1/2	80	990
7 7/8	990	1500
1 110		

# CASING (TEMPORARY)

SIZE (OD)	WALL (IN)	то	FROM
12	0	0	74
		+	





Survey measurement point is top of casing at DTW
MP inside vault

PAIUTES-M-1 (M-1) WELL in California Wash Basin prior to setting up GPS station

# **Nevada Division of Water Resources**

# Well Log Database

# **Query Results**

Type of Site: N

Log No.: 82302

Sequence No.: 61045

Permit No.:

**Basin: 218** 

Notice of Intent#: 45357

**Owner: MARTY MIFFLIN & ASSOCIATES** Mailing/Well Address: 10 MI S OF GLENDALE

Location SE SE

Sec: 09

Twn: 15S

Rng: 65E

Ref: MD State/Co. Code: 32

**Well Construction** 

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: G

**After Hours Pump:** 

**Drilling Method** A

Subdiv. Name:

Source Agency: NV003

Depth to Bedrock:

Hole Depth: 400 feet

Construction Data Quality: G

**Surface Casing Diameter: 8.625 inches** 

Lithologic Data Quality: G

Cased To: 400 feet Casing Reductions: 0

Aquifer Type:

Date Started: 10/11/2000 **Date Complete:** 10/13/2000 Perforations:

Yield G.P.M.

From 360 feet to 400 feet

**Draw Down:** 

**Perforation Length:** 

Pumping Water Level:

Perforation Intervals: 1

**Specific Capacity:** 

Depth of Seal: 50 feet Gravel Packed: N

from feet to feet

**Test Method:** 

Static Water Level: 150 ft below LSD

**Work Type Remarks:** 

Water Temperature: ° F

**General Remarks:** 

Contractor Name: EKLUND DRILLING CO INC

Contractor License Number: 30823

Address: P O BOX 2748 ELKO NV 89803

Contractor's Drlr No.: Driller Lic.No.: 1960

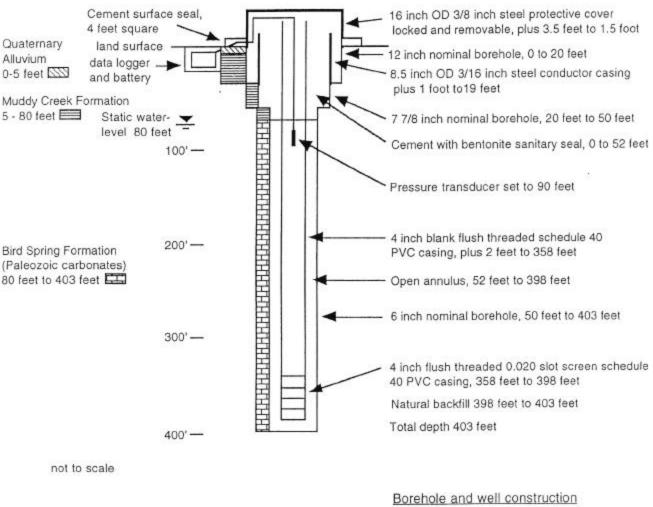
**Additional Remarks:** 

# Moapa Band of Paiutes

# Monitoring Well M-1

# SE 1/4, SE 1/4, S 9, T. 15 S., R. 65 E., MDBM

# Notice of Intent #45357



Borehole and well construction commenced 10/10/00 completed 10/14/00



Survey measurement point is an 'X' etched in the concrete pad (well below DTW MP)

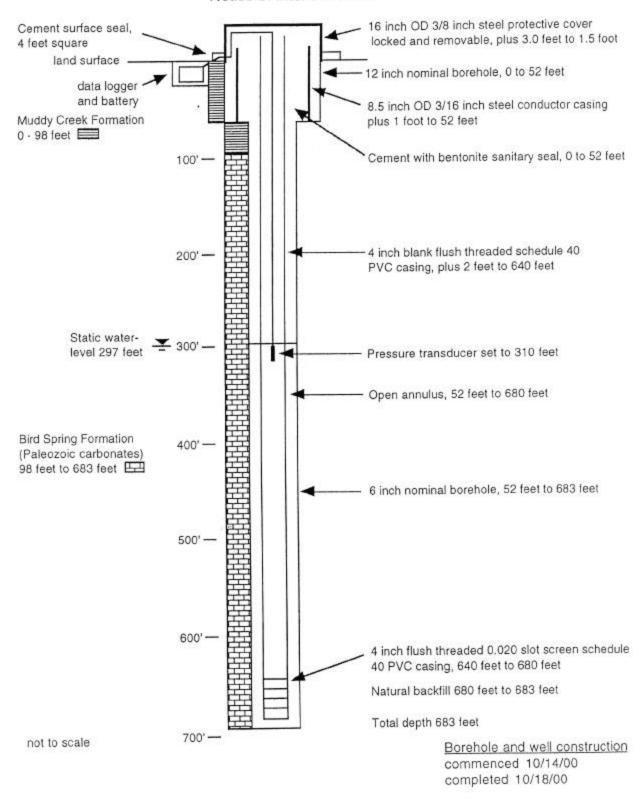
Tim Wolf, LVVWD Professional Land Surveyor setting up a GPS data gathering station on Well M-2 (PAIUTES-M-2 WELL (M-2) in the California Wash Basin.

# Moapa Band of Paiutes

# Monitoring Well M-2

SE 1/4, SW 1/4, S 34, T. 16 S., R. 64 E., MDBM

## Notice of Intent #45362



Monitoring well M-2 borehole history, stratigraphy, and well construction details.



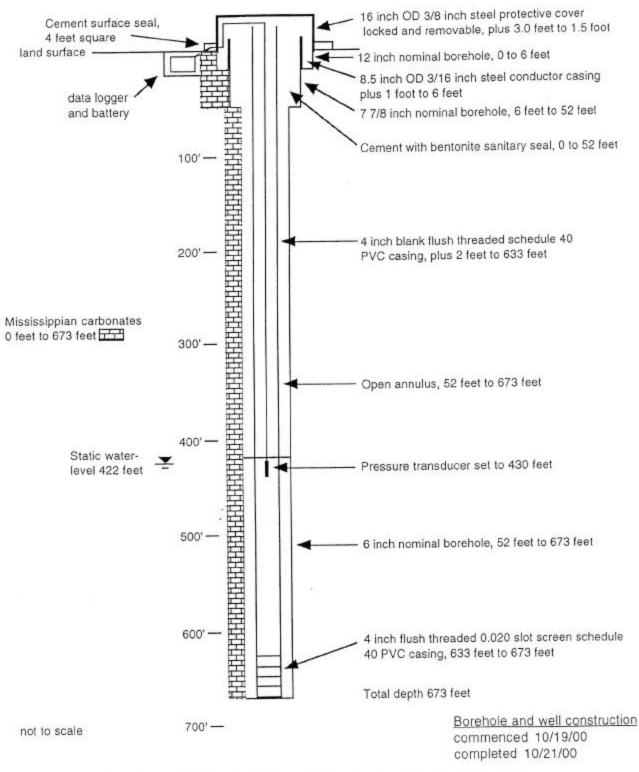
PAIUTES-M-3 WELL (M-3) in California Wash Basin prior to setting up a GPS station

# Moapa Band of Paiutes

# Monitoring Well M-3

NE 1/4, SW 1/4, S 19, T. 16 S., R. 64 E., MDBM

# Notice of Intent #45358



Monitoring well M-3 borehole history, stratigraphy, and well construction details.



Survey measurement point is the top of 4" casing inside vault at DTW MP

PAIUTES-TH-2 (TH-2 ) in California Wash Basin prior to setting up a GPS station

# List of wells in Coyote Spring Valley

Site Name	Alias	Owner
CE-VF-1	365232114554401	USGS
CE-VF-2	365227114554401	USGS
CSV-3	364127114553001	USGS
DF-1	Dutch Flat-1	Coyote Spring Investment, LLC
MX-4	CE-DT-4; USGS 364743114533101	Coyote Spring Investment, LLC
MX-5	CE-DT-5; USGS 364741114532801	SNWA
CSV-RW2	NPC-CSV	Nevada Power Company



Survey measurement point is top of steel casing at DTW MP

Survey team setting up a GPS station on Well CE-VF-1 in Coyote Spring Valley (date on picture is an error)

RSOUNEL "OCATION

WELL CONSTRUCTION SUMMARY

ORDS: 125-63E-29 ELEVATION: GROUND LEVEL 2465

١	LOCATION or COORDS: 123-63E-27	ELEVATION: GROUN	D LEVEL	24	67'	
		1000	CASIN			
I	DRILLING SUMMARY:	CONSTRUCTION	TIME	LOG		040
١	714'		· ST	ART	FIN	ISH
١	TOTAL DEPTH	TASK				
١	BOREHOLE DIAMETER 116 To 40'	77"	DATE	TIME	DATE	TIME
		DRILLING:78		1748/15		
-	DRILLER STEPHENSON DRILLING: MITCHALL	. 26 "REAM	11/15/20		11/15/92	
١	RIG.		11/17/80	00:00 F		1995
١	JERRY MITCHELL & BERT, BEEDLINGER	17: REAM				Izosh
١	RIG _CP-RT-1800	GEOPHYS. LOGGING:	11/15/90	10300	418/50	LOOK
١	BIT(S) 12's TRICING 26 RELINER 17 RELINER	CASING:	1.1.1	in de	1.6-6	
١	74 TRICING.		11/1/2	-	1/15/2	
	DRILLING FLUID BENTONITE. Apprines werest.	10"	11/18/50		11/18/80	17301
	CMC. SOON ASK COORR FIBER.		11/24/90	25.25	11/2/90	1447
	SURFACE CASING 40' x2Z"ID	FILTER PLACEMENT				
1		CEMENTING:				-
	WELL DESIGN:	DEVELOPMENT:	-	-		-
	BASIS: GEOLOGIC LOG GEOPHYSICAL LOG	OTHER:				1 .:
	CASING STRING(S): C=CASING S=SCREEN	* *********	2 24	1		-
1	0 - 246 C1		-	-	-	
T	746 - 286 Ss	-			-	
١	286 - 346 C-		1	-		
١	346 - 406 Sz	- HALA A	N_		<u> </u>	
١	406 - 411 C1	B. F. BL. J. TI	PMENT			•
ł	411 - 47/ 51	HILL BEALT	ı weiii			
ı	T'Somping Tube: 0'TO 408					
1						
1	CASING: 1 +2/ TE 470					
١	2 +2' +0 620'		·			
١						
١	a Vermon	1				
1	2"stotteD + 470' TO 560'					
١	P2 620' 10 7/4'					
1		1 0			L -	
١		GRAVEL PA	CK:		4	
	CENTRALIZERS EVERT 100' FROM THE	ANNUAR SPACE		Au	WALARS	PACE
	BOTTOM UP	10 % WALLOS	wec	24	10 .	
	- S-/	50'-700'	PEA FRAN	se S	0' 10 4	60'
		700-475	4-126A		P	
,		1	Per GR	evel 4	70- 47	5'
	CEMENT 0'-50', 460'-470'	AMELAR SPACE	2 - 8 2420			
•	570-610'.	475'-57			دد	
	OTHER	610' - 7				,
				1		2000



Survey measurement point is top of casing at DTW MP

Well CE-VF-2 in Coyote Spring Valley prior to setting up GPS data gathering station

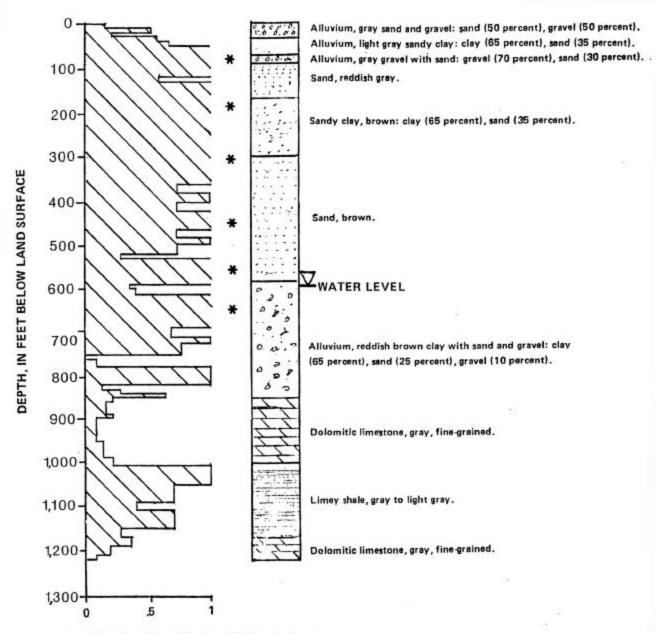
## CE-VF-2

Well CE-VF-2 in Coyote Spring Valley, Lincoln County, is adjacent to U.S. Highway 93, approximately 4 miles north of the intersection of U.S. Highway 93 and State Route 168 (figure 1). The well site is east of Pahranagat Wash in Coyote Spring Valley.

Drilling began on December 15, 1980, and was completed sometime before April 1981 (exact date not known). The reported total depth is 1,221 feet and the water table was near 611 feet below land surface. Dolomitic limestone bedrock was penetrated at 850 feet. The well is cased with 10-inch-diameter blank casing from 0 to 860 feet and is uncased from 860 to 1,221 feet. The casing was set with cement from the surface to 50 feet and from 840 to 860 feet. Nongraded gravel pack was placed in the annulus from 50 to 840 feet. The drilling penetration rate and lithologic log for CE-VF-2 are shown in figure 24, and geophysical well logs are shown in figure 25. Another well, CE-VF-1, was drilled as an observation well approximately 300 feet north of CE-VF-2. A reported depth of 714 feet was attained, bottoming in basin-fill deposits. The water level is 593 feet below land surface, indicating a vertical gradient between CE-VF-2 and CE-VF-1.

Well CE-VF-2 was tested by the Geological Survey in February of The well was developed initially in 1981 by bailing 25 bails per day for 5½ days (16.5 gallons per bail). The pump, flow-meter assembly, and pressure transducer used in 1986 were the same as those used in the test at CSV-2. The pump intake was set at 707 feet and the discharge was piped 80 feet away from the site. The well was pumped at 77 gal/min for 14 hours, and recovery took 2 hours. The pump stopped unexpectedly due to mechanical failure and, as a result, the exact time for the beginning of the recovery portion of the test is uncertain within 1 to 4 minutes. The initial recovery measurements exhibit a great deal of scatter due to rapid oscillations of the water in the well or to problems with the pressure transducer or recorder. Despite these initial difficulties, the long-term recovery of water levels was accurately measured. See tables 12 and 13 and figures 26 and 27. Measurements of water levels in an observation well 300 feet away, CE-VF-1, showed no change during the 14-hour test. The observation well does not penetrate the carbonate aquifer.

(Source: Berger and others, 1988).



PENETRATION RATE, IN FEET PER MINUTE

Drilling penetration rate and lithology for MX test well CE-VF-2. Asterisk indicates penetration rate exceeding 1.0 foot per minute. (Source: Berger and others, 1988).

1-1	J	17	WELL CONSTRUC	CTION SUMMARY	· .	FI	>==D	
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Survey measurement point is the top of 6" PVC casing inside vault at DTW MP

Gathering GPS data at Well CSV-3 in Coyote Spring Valley

# Nevada Division of Water Resources

Well Log Database

CSV-3

# **Query Results**

Type of Site: E

Log No.: 28289

Sequence No.: 3216

Permit No.:

Basin: 210

Notice of Intent#: 4014

Surface Casing Diameter: 6 inches

Owner: U S GEOLOGICAL SURVEY

Mailing/Well Address: 705 N PLAZA CARSON CITY NV

Location SE NE

Sec: 28

Twn: 14S

Rng: 63E Ref: MD

Hole Depth: 780 feet

Cased To: 756 feet

Perforations:

Casing Reductions: 0

State/Co. Code: 32

Waiver No: Type of Work: R Parcel No.:

Proposed Use: X

Lot No.: Drilling Method H

Block No.: Subdiv. Name:

Well Construction

Source Agency: NV003

Depth to Bedrock:

Construction Data Quality: G Lithologic Data Quality: G

Aquifer Type:

Date Started: 2/6/1987

Pumping Water Level:

Work Type Remarks:

Specific Capacity:

General Remarks:

Additional Remarks:

Date Complete: 2/7/1987

Yield G.P.M.

Draw Down:

Test Method:

After Hours Pump:

From 736 feet to 756 feet

Perforation Length:

Perforation Intervals: 1

Depth of Seal: 50 feet

Gravel Packed: N

from 0 feet to 0 feet

Static Water Level: 585 ft below LSD

Water Temperature: ° F

Contractor Name: U S GEOLOGICAL SURVEY

Contractor License Number:

Address: 705 N PLAZA CARSON CITY NV

Contractor's Drlr No.: Driller Lic.No.: 1515

Driller Lic.No.: 151

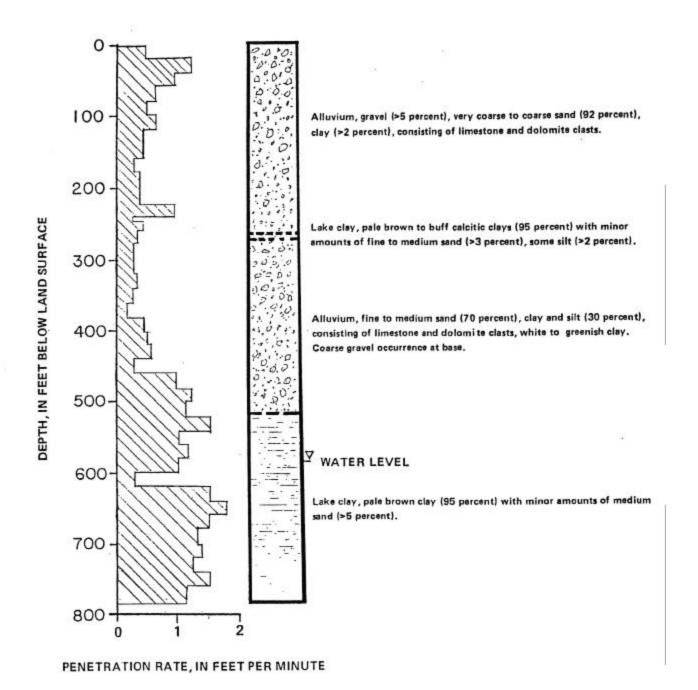
Code Definitions

#### CSV-3

Well CSV-3 in Coyote Spring Valley, Clark County, is adjacent to U.S. Highway 93, approximately 7 miles south of the intersection of U.S. Highway 93 and State Route 168 (figure 1). The well site is in the southernmost part of Coyote Spring Valley, between the Las Vegas Range and the Arrow Canyon Range.

The Geological Survey began drilling on November 6, 1985. Drillingfluid circulation was lost at 430 feet due to a highly permeable and unconsolidated zone identified as a washout on the caliper log. Four thousand gallons of bentonite drilling mud was used as a sealer, but circulation was not regained. On December 18, 1985, a second episode of drilling was started using a 200-gallon mixture of Suprafoam 1 and Supramud to prevent circulation loss. At 515 feet, fluid circulation was lost which required thickening of the drilling fluid. On December 22, a total depth of 780 feet was attained, penetrating basin-fill deposits. The water table was reached about 580 feet below land surface. The hole later collapsed at a depth of 320 feet, and after reopening, 6-inch PVC was installed to a depth of 756 feet with 20 feet of perforated screen at the bottom. A 10-inch diameter, 7-foot section of PVC surface casing was cemented in place. The drilling penetration rate and lithology log are shown in figure 8. Geophysical well logs are shown in figures 9 and 10.

(Source: Berger and others, 1988).



-Drilling penetration rate and lithology for U.S. Geological Survey test well CSV-3. (Source: Berger and others, 1988).



Survey measurement point is an "X" etched in metal casing at (proposed) DTW MP. (The well was welded shut at the time of the survey).

Survey team setting up a GPS data gathering station on Well CSV-RW2 (NPC-CSV) in Coyote Spring Valley

RW-2

# Nevada Division of Water Resources

# Well Log Database

# **Query Results**

Type of Site: N

Log No.: 85546

Sequence No.: 65177

Permit No.: 49608

Basin: 210

Notice of Intent#: 22354

Owner: NEVADA POWER CO

Mailing/Well Address: 3 MI E OF HWY 95 & HWY 168 JCT

Location NW NE

Sec: 26

Twn: 13S

Rng: 63E

Ref: MD State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: P

After Hours Pump: 48

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Well Construction
Hole Depth: 720 feet

Depth to Bedrock:

Surface Casing Diameter: 24 inches

Lithologic Data Quality: G

Construction Data Quality: G

Cased To: 710 feet

Aquifer Type:

Casing Reductions: 1

Date Started: 2/4/2002

Perforations:

Date Complete: 2/25/2002

From 460 feet to 700 feet Perforation Length:

Yield 150 G.P.M.

Perforation Intervals: 1

Draw Down: Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: Y from feet to 711 feet

Test Method: A

Static Water Level: 380 ft below LSD

Work Type Remarks:

Water Temperature: ° F

General Remarks:

Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

Additional Remarks:

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Drlr No.: Driller Lic.No.: 1887

Code Definitions

WHITE-DIVISION OF WATER RESOURCES CANARY-CLIENT'S COPY PINK-WELL DRILLER'S COPY

PRINT OR TYPE ONLY DO NOT WRITE ON BACK

# QW-Z<sub>STATE OF NEVADA</sub> DIVISION OF WATER RESOURCES WELL DRILLER'S REPORT

Please complete this form in its entirety in

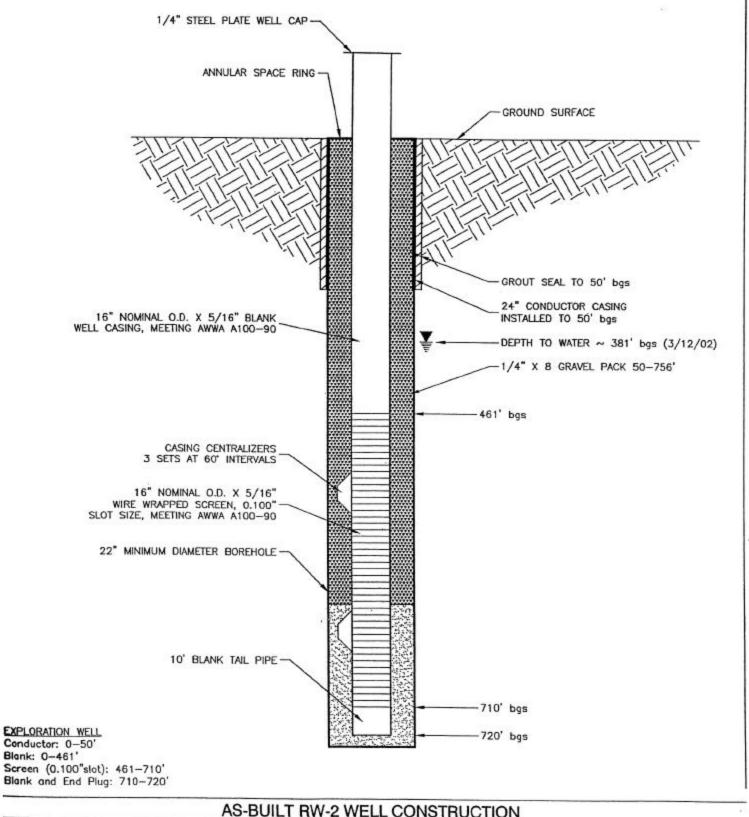
OFFICE USE ONLY

Log No. 95546

Permit No. 79608:

Basin. 218

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☐ Deepen ☐ Aband		her	Ø	Municipal/	Industrial [	Monitor [	□ Stock _	D∤Air □	Other	
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					Date	By driller	performing actu	al drilling on s	ite or cont	ractor



# AS-BUILT RW-2 WELL CONSTRUCTION

**NEVADA POWER COMPANY** Coyote Spring Valley Clark County, Nevada

Scale	N.T.S.
Date 5/	16/02
Drofted By	GLE
Checked By	JMD
Approved By	

44201003 Project No. 01-33442-01 Drawing No.



Over 50 Years of Dedication in Engineering and Environmental Sciences



Survey measurement point is an 'X' etched in concrete at the gate. DTW MP is at the top of casing vault.

Gathering GPS data on MX-4 (CE-DT-4) Well in Coyote Spring Valley

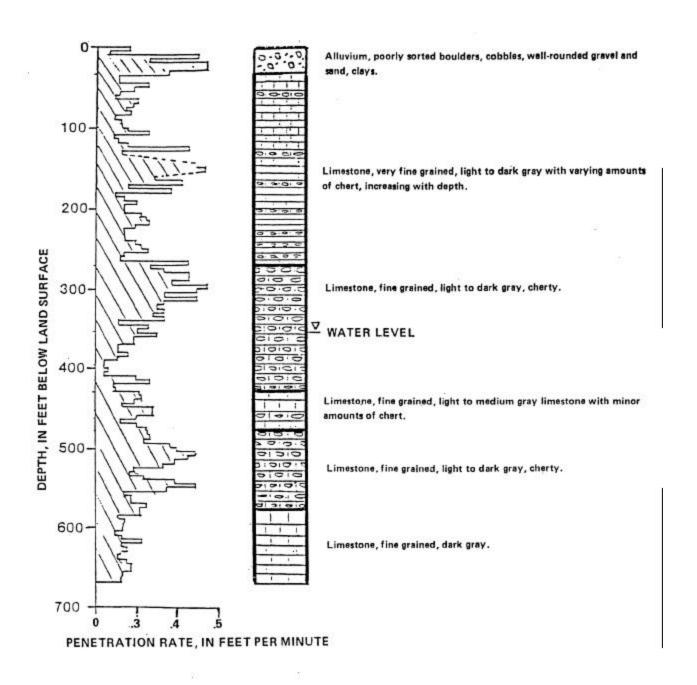
### CE-DT-4

Wells CE-DT-4 and CE-DT-5 are in Coyote Spring Valley, Clark County, and are adjacent to State Route 168 approximately 3 miles east of the intersection of U.S. Highway 93 and State Route 168 (figure 1). CE-DT-4 is located approximately 300 feet west of CE-DT-5. The well sites are in the southeasterly draining Pahranagat Wash and just north of the Arrow Canyon Range.

Drilling began on CE-DT-4 on November 20, 1980. Limestone bedrock was penetrated at 30 feet below land surface, and a total depth of 669 feet was attained on December 6, 1980, when circulation loss terminated the drilling. The water table was reached at 352 feet below land surface. Due to vertical deviation of the well, cement was installed from 20 feet to the surface, drilled with a 7-7/8-inch-diameter milltooth tricone bit, and reamed with a 17-1/2-inch-diameter button bit. Three feet of 16-inch casing was set at the surface to facilitate sampling. Ten-inch-diameter surface casing was installed from 0 to 50 feet; the remainder of the hole was uncased. The drilling penetration rate and lithologic log are shown in figure 11. Figure 12 shows the geophysical well logs for the hole.

Well CE-DT-4 was tested in December 1980 by Hydro Search, Inc. The well was developed by surging five times with the drill-rig airlift at 1,100 ft<sup>3</sup>/min before a pump was set. Details of the pump setup are not available. The test lasted 3 days and 5 hours, and the discharge rate was about 530 gal/min (figure 13). Recovery occurred within 2 minutes after the pump was turned off and only a few water-level measurements were made (figure 14). Water-level drawdowns during pumping and recoveries after the pump stopped are shown in table 7. CE-DT-4 was also used as an observation well when aquifer tests were made at CE-DT-5.

(Source: Berger and others, 1988).



-Drilling penetration rate and lithology for MX test well CE-DT-4. (Source: Berger and others, 1988).

# DIVISION OF WATER RESOURCES WELL DRILLERS REPORT Please complete this form in its entirety

Log No. 2355 Permit No.	0
Permit No.	3
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2. LOCATION SE 14 SE PERMIT NO.	1/4 Sec	. 23	т.	13	DDRESS MX Ballistic Missle Office Beach California A X - 4  N/S R 63 E Clark County
3. TYPE OF WO	ORK -		4. Do	-	PROPOSED USE  5. TYPE WELL  Irrigation
6. LITHOI	OGIC LOG				8. WELL CONSTRUCTION
Material	Water Strata	From	To	Thick- ness	Diameter hole 9 7/8" inches Total depth 669 feet Casing record 0 to 50 feet
Alluvium		0	8	8	Weight per foot
	1 2	8	20	12	
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Limestone w/ Chert		80	270	190	10.10 inches 0 feet 50 feet
Cherty Limestone		70	430	160	inches feet feet
Limestone '-		30	480	50	inchesfeetfeet
Cherty Limestone	1	80	580	100	inches feet feet
Limestone		80	669	89	inches feet feet
		11.00			inches feet feet
		14	2.1		Surface seal: Yes X No Type Neat Grout
					Depth of seal 50 feet feet
					Gravel packed: Yes No KX  Gravel packed from feet to feet
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		-			Perforations:
	-				Type perforation
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+ +	+-+			-	Flow
		77		2 FEE	- Vater temperature 90 ° F. Quality
Date started	ember 20 ember 12			1980 1980	10. DRILLERS CERTIFICATION  This well was drilled under my supervision and the report is true to the best of my knowledge.  Name Don Peskcka
Pump RPM G.P.M.	Draw Down	-	After Hours	Down	A TABLE TO THE TAB
Thump to the Oil and	Diam Down		Alter Hours	Pump	Address 787 S. 950 W. Woods Cross, UT
					Nevada contractor's license number
					Nevada driller's license number. 1235
BAIL	ER TEST				Signed
G.P.M	Draw down	f	eet	hours	5.6.174
	Draw down			hours	Data
	Draw down				Date
	-Ian down	T		nours	

CANARY-CLIENT'S CUPY PINK-WELL DRILLER'S COPY

# DIVISION OF WATER RESOURCES

# WELL DRILLERS REPORT

V	0	FICE USE ONLY
1	Permit No.	Y MAL
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V-		

Please complete this form in its entirety AIR FORCE ADDRESS MY LONG BEACH Blud

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		-	-	-	-	FlowG.P.M
		-	-	-	-	Water temperature 90 ° F. Quality
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Date complete		2			1000	This well was drilled under my supervision and the report is true to
Date complete	Z				19.0	the best of my knowledge.
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G.P.M	***************************************	Draw dow	n1		hours	Date 12-10-80

Draw down.....feet .....hours



Survey measurement point is an 'X' etched in the top of casing at DTW MP

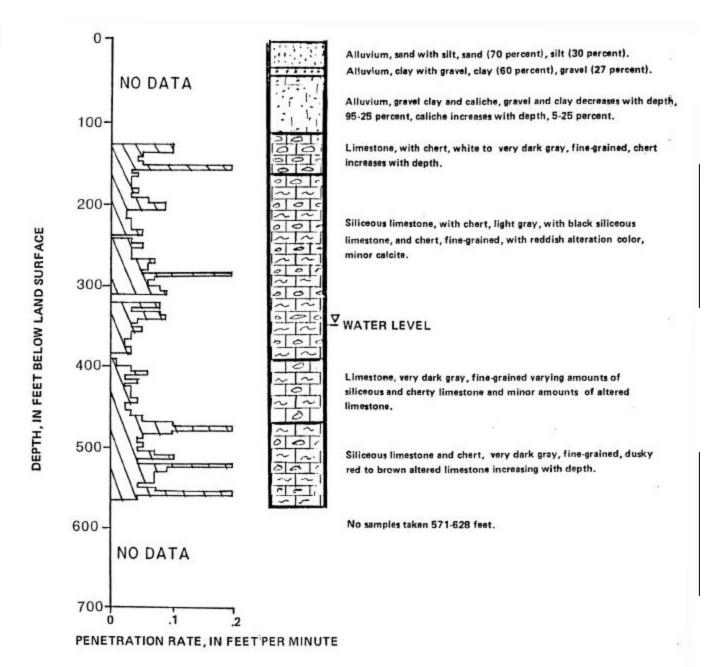
Gathering GPS data on MX-5 (CE-DT-5) Well in Coyote Spring Valley

### CE-DT-5

See section on well CE-DT-4 for location of this well. Drilling began on CE-DT-5 on April 13, 1981. It was completed on May 6, 1981, at a total depth of 628 feet. Limestone bedrock was reported at 110 feet and the water table was reached at 350 feet below land surface. The well was cased with 20-inch-diameter steel casing and cemented to 126 feet. Frequent loss of circulation of drilling fluid was recorded. Two zones of significant circulation loss were encountered at 387 feet and 571 feet. The upper zone was cemented off and drilling continued through the lower zone until it became apparent that significant saturated fractures were penetrated. The drilling penetration rate and lithologic log for this well are show in figure 15. A temperature log is shown in figure 16.

Well CE-DT-5 was tested during August and September of 1981. The well was developed by bailing 37 times. The bailer held 30.8 gallons. A vertical turbine pump with 10-inch-diameter discharge pipe was used in testing the well. The intake was set at 500 feet. Discharge was measured with orifice plates and a piezometer tube, and was piped 200 feet to an alluvial channel. Water levels were measured in the well and at observation well CE-DT-4 with a recording pressure transducer. Periodic checks were made by electric sounder and barometer to correct for atmospheric-induced drift. Water levels at six other observation wells and discharge at six springs were monitored daily but no effects due to pumping were discerned. The test, which was the eighth in a series of constant and step discharge tests, lasted 30 days and 3 hours, with a 3-hour shutdown for maintenance 13 days and 14 hours into the test. The initial increase in drawdown between 0.07 and 0.60 minutes, as shown in figure 17, represents the filling of the pump column before water from the formation was pumped. Table 8 and figure 17 present data from MX test well CE-DT-5, and table 9 and figure 18 present data from observation well CE-DT-4 during the testing at CE-DT-5.

(Source: Berger and others, 1988).



-Drilling penetration rate and lithology for MX test well CE-DT-5. (Source: Berger and others, 1988).

PINK	WELL DRIL	LER'S COI	Y	1-4	DIV	ISION	OF WAT	TER RESOUR			og No	2282	I WALL
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Survey measurement point is at top of flange at the lid of 6" casing at white mark, the DTW MP

Gathering GPS data on Well DF-1 (Dutch Flat) in Coyote Spring Valley

DF-1

### Nevada Division of Water Resources

### Well Log Database

### **Query Results**

Type of Site: N

Log No.: 66237

Sequence No.: 44800

Permit No.:

Basin: 210

Notice of Intent#: 8995

Owner: AEROJET GENERAL CORP

Mailing/Well Address:

Location NE NW

Sec: 03

Twn: 12S

Rng: 63E

Ref: MD

State/Co. Code: 32

Waiver No:W-2043

Depth to Bedrock:

Parcel No.:

el No.:

Lot No.:

Block No.:

Well Construction

Type of Work: N

Proposed Use: X

After Hours Pump:

Drilling Method H

Subdiv. Name:

Source Agency: NV003

Hole Depth: 170 feet

Construction Data Quality: G

Surface Casing Diameter: inches

Lithologic Data Quality: G

Cased To: feet

Aquifer Type:

Casing Reductions: 0

Date Started: 5/27/1992 Date Complete: 5/28/1992 Perforations:

Yield G.P.M.

From feet to feet Perforation Length:

Draw Down:

Perforation Intervals: Depth of Seal: 150 feet

Pumping Water Level: Specific Capacity:

Gravel Packed:

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: ft below LSD

Water Temperature: ° F

General Remarks:

water remperature.

Contractor Name: MITCHELL ENTERPRISES

Contractor License Number: 27030

Additional Remarks:

Address: 4250 S ARVILLE #262 LAS VEGAS NV

Contractor's Drlr No.: Driller Lic.No.: 1475

Code Definitions

### List of Wells in Garnet Valley

Site Name	Alias	Owner
GARNET WELL		NDOT
GV-1		Dry Lake Water, LLC
GV-2		Dry Lake Water, LLC
GV-MIRANT1	Mirant Production Well	Mirant Las Vegas, LLC
GV-PW-MW-1	Pinnacle MW-1	Gen West
GV-PW-MW-2	Pinnacle MW-2	Gen West
GV-RW1	NPC-Harvey Well Replacement	Nevada Power Company



Survey measurement point is top of aluminum lid on casing at pink mark, the DTW MP

Gathering GPS data on GARNET WELL in Garnet Valley

# Garnet Well

### STATE OF NEVADA

### DIVISION OF WATER RESOURCES

### WELL DRILLERS REPORT

Please complete this form in its entirety

		OFFICE	USE ONLY
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New Well ⊠ Recondition □ Domestic □ Irrigation □ Test □ Cable □ Rotary F  Deepen □ Other □ Municipal □ Industrial × ☑ Stock □ Other □ R.C.  **WELL CONSTRUCTION**	i. OWNER Stat	te of Neva	ada			AI	DRESS Nevada	St. Highwa	y Dept.
TYPE OF WORK							Pego N	evada 8905	Δ
TYPE OF WORK				7		10		Liarly Aren	
TYPE OF WORK	2. LOCATION	/ VV 14 NW	1/4 Sec		T		N/S RD.4E.	L.IAIK	Count
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Carry & gravel   Strats   From   10   Fr	6.	LITHOLOG	GIC LOG				8. W	ELL CONSTRUC	CTION 500
Display & gravel   0   50   50   50   50   100	Materi	ial		From	То		Diameter hole O	inches T	otal depthfer
100	rlay & pray	el		0	50	50	Weight per foot		Thickness
150 275 125   125   125   125   125   128   128   1275   125   128   1275   128   1275   128   1275   127				50	150	100			
SEP13972		61						her +1	feet 500 fee
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From	SEP	1 9 181 6		_	- 1				
## Prom.   Teet to   Teet	DIV OF WAT	ER RESOURCE							
9. WATER LEVEL  Static water level. 240. Feet below land surface. Flow. G.P.M. Water temperature. F. Quality. Salty  Date started. August 28. 19.72. Date completed. September 10. 19.72.  This well was drilled under my supervision and the report is true the best of my knowledge.  7. WELL TEST DATA  Pump RPM G.P.M. Draw Down After Hours Pump 2150 60 140 24  Nevada contractor's license number. 4286  Nevada drillegs license number. 581  BAILER TEST G.P.M. Draw down feet hours G.P.M. Draw down feet hours G.P.M. Draw down feet hours Date September 11, 1972	- SAANO	H-OFFICE					From	feet to	fe
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G.P.M		100					DateJap.v.allic		
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Survey measurement point is an 'X' on top of flange on vault casing, below the DTW MP; DTW MP is the top of inside casing

Well GV-1 in Garnet Valley prior to setting up a GPS data gathering station. The well has since been fenced.

WHITE—DIVISION OF WATER RESOURCES CANARY—CLIENT'S COPY FINK—WELL DRILLER'S COPY

PRINT OR TYPE ONLY DO NOT WRITE ON BACK

### STATE OF NEVADA DIVISION OF WATER RESOURCES

### WELL DRILLER'S REPORT

Please complete this form in its entirety in cordance with NES 534,170 and NAC 534,1

OFF	TICE USE ONLY
Log No.,	
Permit No	
Basin	

1. OWNER DRY LAKE W	ATER C	ю.			ADDRESS AT WELL	NOTICE O	OF INTENT NO.	19747
PIALLING ADDRESS.					- 			
2 LOCATION NE 7/ N PERMIT NO. W-2088 Jestical by Water Res	E4 S	084-3	7 2-000-	17 001	N/S R 63 .!!	.CL	ARK	
3. WORK PERFORM		_						
Mew Well Replace	Recon Other.	dition		Domestic Municipal/	ROPOSED USE    Irrigation	☐ Test ☐ Stock ☐	WELL TYI Cable IX Rotan IX Air □ Othe	y D RVC
6. LITHOL	OGIC L	OG				ELL. CONSTRU	UCTION .	
Material	Water	From	То	Thick-			1	00 Feet
SANDY CLAY & GRAVEL		0	460	460	HOL	E DIAMPTER		
CLAY, SAND & GRAVEL		460	770	310	11in	From thes0	To Feet 1400 F	
STREAKS OF SANDY CLAY			1					555
& CEMENTED GRAVEL		770	1020	250				ect
LIMESTONE WITH STREAK	\$		1		(R)	ines	reet	eet
OF SANDSTONE	X	1020	1080	60	Commence of the commence of th	CV2ING 2CHE	57 (F)	•
LIMESTONE	х	1080	1350	270	Size O.D. Weight/Pt. (Inches) (Prounds)	Wall Thicknet (Inches)	ess From (Feet)	To (Feet)
CEMENTED GRAVEL	х	1350	1365	15	5 5/8 10.9	.188	+2	
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					Type perforation	SAW		
					Size perforation	1/8 X 3		
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					From 1140 From 1240	feet to		feet
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					Depth of Scal 40		□ N	at Cement
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	in a masses				From 40	feet to	1400	feet
					9.	WATER LEV		
					Static water level,	888	foct below	land surface
					Artesian flow		G.P.M	P.S.I.
					Water temperature	*F Qua	ality	
			Vennes.		IO. DRU	LLER'S CERTI	FICATION .	
Date started	4/27/0	0	FEE	XX	This well was drilled u			is true to the
	5/5/00			19	best of my knowledge.			40 10 410
				., XX	Name WATER W	ELL SERVIC	ES	
7. WELL	TEST DA	TA				Contro	ctor	
TEST METHOD: BE	iler [	Pump	☐ Air L	lft	Address 6475 GA			
G.P.M. (Feet	rew Down Below Su	ile)	Time (Ho	its)	LAS VEG		139	
					Nevada contractor's lic	ense number	222111	
					issued by the State C			
		On the state of			Nevada driller's licens	number issued	by the	0.6
	1				Division of Water Re	sources the	file driller	94
				-	Signed Mu	146	VITO	-
					By drille	performing school	orilla an site or cont	ractor
					Date5	/8/00		
				Statement Commence	The state of the s			



Survey measurement point is top of casing at the DTW MP

Well GV-2 in Garnet Valley prior to setting up GPS data gathering station

WHITE—DIVISION OF WATER RESOURCES CANARY—CLIENT'S COPY PERK—WELL DRILLER'S COPY

### STATE OF NEVADA

### DIVISION OF WATER RESOURCES

PRINT OR TYPE ONLY DO NOT WRITE ON BACK

WELL DRILLER'S REPORT

Please complete this form in its entirety in

OFFIC	E USE ONLY	
Log No		
Permit No		
Basin		

- 1101 11111			accord	lance with	NRS 534	.170 and NA	C 534.340	NOTICE OF IN	TENT NO	22211
. OWNER D	y Lake	Water				ADDRESS A	T, WELL LO	cation	<del>) / /-</del>	L #6
MAILING ADD	RESS 270	Verada	jale	ay St	200	1-15	3 HDEY	Frontage 1	Cd Ey	rsa
. LOCATION	NE 14	NE 1/4 Sec	27	T	18	_N(\$)R6	3 E	CIGIK		County
ERMIT NO	66 789 Issued by Wate	r Resources	122-	Parcel No.	1-004			Subdivision Name		
	WORK PERF			4		PROPOSED		5	WELL TY	
New Well Deepen	☐ Replace ☐ Abandon	☐ Recondi	tion		Domestic Municipal/	Industrial C	Irrigation [] Monitor []	Test Ca	able Rota	
	LIT	HOLOGIC LO	G			8.		L CONSTRUCTI		
Mat	terial	Water Strata	From	То	Thick- ness	Depth Dril	led /232			3Z Feet
Over bu	rden	Stieta	0	3	.3		HOLE	DIAMETER (BIT From	SIZE)	
Lime stor		620	3-	1232	1229		28 Inche	es O Feet	52	
interminte	ut Frac			-			17 1/2 Inche		1232	
							Inche	SING SCHEDUL		Feet
	02/02/2003					Size O.D.	Weight/Ft. (Pounds)	Wall Thickness	From	To
						(Inches) -20	(Pounds)	(Inches)	(Feet)	(Feet)
						10	40.48	.365	-/	1232
						Perforation Type r	s: perforation 4	ouverd (	Pascael	Moss)
						Size p	erforation/	00 Slot	92	
				<u> </u>			52 072		.37	feet
				-	-	From		feet to		feet
-						From		feet to		feet
						Surface Se	cal: Yes	□ No	Seal T	ype:
				A 10 (10 A)			Seal 52	-		leat Cement Cement Grout
			-		1.7	Placement	Method:	Pumped Poured		Concrete Grout
			-7	W .	12.	Gravel Pac		s No		
				1. 3	1	From		feet to		feet
			000 75	1. 9	1	9.		WATER LEVEL		
						Static water	er level6	20		w land surface
				<u> </u>		Artesian f	/ /			P.S.I.
				4700-00-0		-	perature.6/	°F Quality.		
	-20 -	~ /				10.		LER'S CERTIFIC der my supervision		rt is true to the
Date started		01			, 🎞	best of my	y knowledge.		1821	
7.		ELL TEST DA	T.		<b>2</b>	Name	Layne	Christer	isen (	G
	METHOD:		Pump	Air	16	Address	12030	E Rigg	3 Dd	
ILOI II	G.P.M.	Draw Down	1			Clau	-1/25	Arizona	857	749
200 PSF	/DO	(Feet Below State		Time (He	ours)	Nevada c	ontractor's lice	nse number	1910	/-
						Nounds d	-illanta liasassi	ntractor's Board number issued by	the 10	187
						22 1 22	or water Kes	ources, the on-site		
				V-1+3/2/2/2/2	1 -	Signed	By driller	performing actual drill	ing on site or co	ontractor
						Date				



Survey measurement point is the top of 2" access port at the DTW MP

Sean, taking notes during GPS data gathering on GV MIRANT1 (MIRANT-1) in Garnet Valley

## PW- Broduction Well

### Nevada Division of Water Resources

### Well Log Database

### **Query Results**

Type of Site: N

Log No.: 85894

Sequence No.: 65528

Permit No.: 68161T

Basin: 216

Notice of Intent#: 21092

Owner: LVVWD

Mailing/Well Address: I-15 & HWY 93

Location SE NE

Sec: 05

Twn: 18S

Rng: 63E

Ref: MD State/Co. Code: 32

Well Construction

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Depth to Bedrock:

Proposed Use: P

**Drilling Method R** 

Subdiv. Name:

Source Agency: NV003

Hole Depth: 2007 feet

Construction Data Quality: G

Surface Casing Diameter: 12 inches Cased To: 1979 feet

Lithologic Data Quality: G

Casing Reductions: 0

Aquifer Type:

Perforations:

Date Started: 12/5/2001 Date Complete: 3/1/2002

From 1197 feet to 1979 feet

Yield 1000 G.P.M.

After Hours Pump: 72

Perforation Intervals: 6

Perforation Length:

Draw Down: 138.64
Pumping Water Level:
Specific Capacity:

Depth of Seal: 300 feet Gravel Packed: Y

Specific Capacity: Test Method: P

from 300 feet to 1979 feet

Work Type Remarks:

Static Water Level: 754.95 ft below LSD

Water Temperature: 80.4° F

General Remarks:

water remperature, 60.4 r

Contractor Name: LANG EXPLORATORY DRILL

Contractor License Number: 21976

Additional Remarks:

Address: 2286 W 1500 S SALT LAKE CITY UT 84

Contractor's Drlr No.: Driller Lic.No.: 1826

**Code Definitions** 

WHITE-DIVISION OF WATER RESOURCES
THENEY-CLIENT'S COPY
PINK-WELL DRILLER'S COPY

PRINT OR TYPE ONLY DO NOT WRITE ON BACK

### STATE OF NEVADA

#### DIVISION OF WATER RESOURCES

### WELL DRILLER'S REPORT

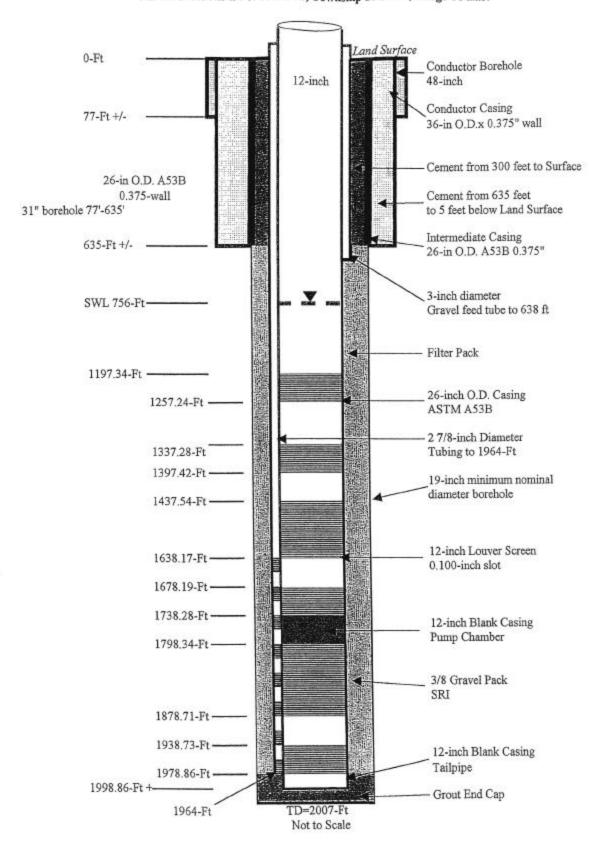
Please complete this form in its entirety in accordance with NRS 534,170 and NAC 534,340

	OFFICE USE ONLY	
Log No		
Permit 1	¥0	
Basin		

<ol> <li>OWNER LAS MAILING ADDRE</li> </ol>	SS.P.O. Box	34089				Apex Ind	lustrial	Comple:	x		
	Las Vegas										
2. LOCATION	SE W NE	1/4 Se		T	18	_N/# R	63 F	Clark			County
PERMIT NO	68161-T	rces	N/4	Parcel No.		N/A		Subdivision	Name		
3 W	ORK PERFORM	FD	manufacture in the same	4.		PROPOSED	TICE		5.	WELL TYP	E .
New Well	Replace	Recondi	ition	DI	Domestic Municipal		Irrigation [	Test Stock		le Rotter	Y TERVO
6.	LITHOLO	OGIC LO	G	- Arm		8.	WE	LL CONS	TRUCTIO	N	
Mater	fel	Water	From	To	Thick- ness	Depth Dril	led 2007.	Feet	-	ased 199	2Fee
Gravel, Lime	stone, Sand		0	100	100	i i	HOLE	DIAMETI			
Limestone, S	COLUMN TWO IS NOT THE OWNER, THE PARTY OF THE OWNER, TH		100	160	60	1	48 Inch	From	Fe <i>e</i> s	77 F	cer
	stone, Sil	v San		270	110	1	31 Inch				cet cet
Limestone. S			270	300	30	78	19 Inch				
	y Sand		300	320	20			-	Feet_		cet
Fine Grain G		1	320	330	10	1	4	ASING SC			10 3000
		Sand	330	410	80	Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thi		From (Fest)	To (Feet)
Limestone. S			410	480	70	36		.379		0	77
Silty Clay &			480	530	50	26		37		0	635
Silty Clay &			530	540	10	12		37		+2	1197
Limestone &			540	580	40	Perforation	· ·			7	11,37
Silty Clay			580	610	30			ouvered	d Scree	žD.	Paris
Limestone Be	drock		610	620	10	Size p	erforation L erforation	100 in	ch slot		
Brown Limest			620	770	150		97			257	feet
Gray Limesto	ne		770	810	40		37.	foot		197 538	feet
Limestone. (		er	810	890	80		78	feet		738	feet
Fractured Li			890	970	80		98	feet		379	foot
Dalomitized	Limestone		970	1200	230	Surface Se	A K Yes		11	379	
ractured lines	tone veins		1200	1250	. 50	Depth of S		LING		Seal Ty	pe: eat Cement
Black Limest				1355	105		Method: X	Demond	-		ement Grout
ractured black	limestone		1	1600	245	Procement		Poured		-	oncrete Grou
ractured black	cire veins			1620	20	1			27		
				1670	50	Gravel Pac	aked: 🔼 Y				
Brown Limeston	cite veins			1745	75	From	300	feet	to1	9/9	feet
				1805	60	9.		WATER	LEVEL	22	
Tay Limestone	tire veins			1885	80	Static, water		54.95			iand surfac
Black Limeston	cire veins			1935	50	Artesian fi		The second second second	G	PM N/A	P.S.!
Rlack Limes:				2007	72	Water tem	perature 80	1.4 °F	Quality		
						10.		LER'S CE			
Date started De	cember 5				3002	This well	was drilled un knowledge.	der my sur	ervision a	ad the report	is true to th
Date completed	March 1				7002	Name To	ang Explo		Des 11		
7.	WELL 7	TEST DA	TA	******	4777.	-		- 1	Contractor		
TEST ME	THOD: DB	iller [	Pump	Air I	Lift	Address_	2745 W.	Califo	Contractor	ve.	
	G.P.M. (Fee	Below Stat	ies	Time (He	pers)	1	Salt Lak	ce City		84104	
Pumped		18-64	_	2		Nevada co	ontractor's lice by the State Co	ense numbe	Board O	021976	
						Nevada d	riller's license a of Wages Re	number is	sued by th	c 19	326
			-			-	Kus	1. 1	arti	riller——	-
			-		7 -	Signed	By driller	performise	scrupt drilling	g on size or con	NUTACEOF
						Date	By driller	performing RCH 8	200	g on site or con	stractor.

### MIRANT LAS VEGAS, LLC GARNET VALLEY WELL No. 3 PRODUCTION WELL SCHEMATIC

### NE 1/4 of the NE 1/4 of Section 5, Township 18 South, Range 63 East





Survey measurement point is an "X" on west side of concrete pad; DTW MP is top of 2" casing inside vault

Preparing to set up a GPS data gathering station on Well GV-PW-MW1 in Garnet Valley

WHITE-DIVISION OF WATER RESOURCES CANARY-CLIENT'S COPY PINK-WELL DRILLER'S COPY

#### STATE OF NEVADA DIVISION OF WATER RESOURCES

#### WELL DRILLER'S REPORT

	OFFICE USE ONLY
Log No	
Permit No.	
Basin	

PRINT OR TYPE ONLY Please complete this form in its entirety in DO NOT WRITE ON BACK accordance with NRS 534.170 and NAC 534.340 NOTICE OF INTENT NO. 22/92 I. OWNER SEN WAST LIC ADDRESS AT WELL LOCATION 4 MILES W. OF THE ON MAILING ADDRESS P & Box 52797 MS 8987 HMY 93 & O. R. MILES 5 OF HWY 93 PHENNIX AZ 85072 - 3999 63 15 2. LOCATION NW 4 5W 4 Sec. CLARK 54073 PERMIT NO .\_ Issued by Water Re-Sabdivision Name Parcei No. WORK PERFORMED PROPOSED USE WELL TYPE \_\_,Test \_\_ Stock New Well ☐ Replace ☐ Recondition ☐ Cable ☐ Rotary ☐ RVC □ Domestic □ Irrigation Air Other.... Deepen ☐ Abundos Other.... LITHOLOGIC LOG WELL CONSTRUCTION Depth Drilled 1500 Feet Depth Cased 1500 Feet Thick-Material From HOLE DIAMETER (BIT SIZE) 10' Allerial GRAVEL 01 in' 10-She 27 1 Line Stand 50' 40' Inches Q' Feet Sa Feet 140 8 Inches 50' Feet 980' Feet 130 GRAY MERITIC LIMITERS SA 90' 78" Inches 980' Feet 1500' Feet 210 SAUDY Limitator 201 210 340 110 SMOKITHE AUAPSTONE CASING SCHEDULE 570' 2300 SILT . J. . STONE 340 Weight(F). Wall Thickness (Inches) 280 570' 200 Short Linestone was Course to had 224 1500 a' 9:00 Laxe 1300 Market Limitation 110 PLUCK CH. 11 LIMESTONE loke 1190 SHAY ENGLITE LIMPSTONE 1120' 280' 14.20 Perforations: PERSONAL WATER 1470 Size perforation 030 LEHT GLAY CHTY M70' 30' I Can feet to \_\_\_\_/500 " 2001 .feet Lim stora From feet to. feet From\_ feet to. feet From. feet to feet Prom feet to feet Seal Type: Surface Seal: □ No Yes Neat Coment 50' Depth of Scal. Coment Grout Placement Method: Pumped Concrete Grout Poured Gravel Packed: Yes \_\_feet to\_/500 WATER LEVEL 692 feet below land surface Static water level .-Artesian flow\_ G.P.M. Water temperature.... Quality. DRILLER'S CERTIFICATION This well was drilled under my supervision and the report is true to the 12-19-01 best of my knowledge. Date completed 1 = 22-02 10 Name LAYNE CHRISTENSEN WELL TEST DATA Address 12030 C Ress Ro TEST METHOD: ☐ Bailer ☐ Pump Air Life Draw Down (Feet Below Static) CHAMOUR, AZ 85249 G.P.M. Time (Hours) Nevada contractor's license number I HR issued by the State Contractor's Board - 0019101 - - 2-3-Nevada driller's license number issued by the Division of Water Resources, the on-site driller 2133 Signed Auditor Land deliting on sine or contractor 1-22-02

Date....



Survey measurement point is an "X" on west of concrete pad; DTW Mp is top of 2" casing inside vault

Well GV-PW-MW2 in Garnet Valley prior to setting up a GPS data gathering station

### Crv-PW-MW-Z

### Nevada Division of Water Resources

### Well Log Database

### **Query Results**

Type of Site: N

Log No.: 85526

Sequence No.: 65157

Permit No.:

Basin: 216

Notice of Intent#: 22193

Ref: MD

Owner: GEN WEST L L C

Mailing/Well Address: 4 MI W OF I15 & .8 MI S OF HWY 93

Location NW SE

Sec: 05

Twn: 18S

Rng: 63E

State/Co. Code: 321

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: G

After Hours Pump: 1

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 1500 feet

Construction Data Quality: G

Surface Casing Diameter: 2 inches

Lithologic Data Quality: G

Cased To: 1500 feet Casing Reductions: 0

**Aquifer Type:** 

Perforations:

Date Started: 11/27/2001 Date Complete: 12/14/2001

From 940 feet to 1500 feet

Yield 75 G.P.M.

Perforation Length:

Draw Down:

Perforation Intervals: 1

**Pumping Water Level:** 

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: Y

Test Method: A

from 900 feet to 1500 feet

Work Type Remarks:

Static Water Level: 716 ft below LSD

Water Temperature: ° F

General Remarks: Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

**Additional Remarks:** 

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Drlr No.: Driller Lic.No.: 2133

**Code Definitions** 



Survey measurement point is top of 2" access port east of big casing taped at the DTW MP

Gathering GPS data on Well GV-RW1 (Harvey Well Replacement) in Garnet Valley

PRINT OR TYPE ONLY

DIVISION OF WATER RESOURCES

### WELL DRILLER'S REPORT

Please complete this form in its entirety in

~~		1-101	277	
Perr	mit No	60	022	
D	216	,		
Bas	116-7			

DO NOT WRITE ON BACK	malor	A accord	ance with	NRS 53	4.170 and NAC	534.340	NOTICE OF IN	NO 1	12169
1. OWNER NEVADA PO	Va						NOTICE OF IN	TENT NO.	
1. OWNER /VEV A CA 10	WCI	Cabra	AV		Nev H	L MELL LC	CATION		
MAILING ADDRESS 6226	UCST.	Salino	ע בו	-	1728	ZN	Las vega	S BIVA	
2. LOCATION NW 45 W	1/- \$0	. 21	T 10	)	NO R b	4 F	C	ark	County
PERMIT NO. 600 22 Issued by Water Resou		1083-	Parcel No.	-007	parcel #	COVE	S SectionS Subdivision Name	20 +	4
3. WORK PERFORM			4.		PROPOSED U	JSE	5.	WELL TYP	E .
□ New Well Replace □	Recond	lition		Domestic		Irrigation [		ble Rotar	
☐ Deepen ☐ Abandon ☐	Other		- 501	Municipal	/Industrial 🗆		☐ Stock ☐ Ai		
6. LITHOL	OGIC LO	OG			8.	4 - 7	LL CONSTRUCTI		_
Material	Water Strata	From	То	Thick- ness	Depth Drill		Feet Depth DIAMETER (BIT	Cased	Feet
Hard Clay+Gravel		0	10	10	] _	- II	From	, Ton	
clay		10	60	50		O," Inch	resFeet		eet
clay with gracel		60	70	10	1 17	a Inch	res 2) S Feet	903 F	ect
clas		70	130	50	-	Inch	iesFeet	F	eet
clay		120	120	50	-	. c	ASING SCHEDUL	.E	F1 (1)
<u>Clay</u>	1000000	170	220	50	Size O.D.	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
Cláy		220		50	(Inches)	(Pounds)	125	0	45
cláy		320	320	50	12	1'-1 0	0+ case	4.5	902
Clay		320	420	50	1.0	2665	Le to abo	ndon	100
Clay		420	470	50	Perforation				-
C. O. V		470	500	30		erforation	*:-		
clas and line dos		500	520	20		rforation			feet
lime stone		520	570	50	From		feet to		feet
lime stone with clay		570	580	10	From		fect to		feet
linestone		045	670	50	From		feet to		feet
limest on L		620	660	50	From		feet to		feet
limes +676		186	230	50	Surface Se	al: 🛛 Ye	s 🗆 No	Seal Ty	pe: eat Cement
linestone with some cle	<b>)</b>	130	280	50	Depth of S			- Contract C	ement Grout
Linestone -		£30	850	30	Placement	Method:	Pumped Poured		oncrete Grout
Lime Hone		850	820	26	-				
limestone		×30	890	20	Gravel Pac	ked: ⊔ \	res ZO No		6
line stone		690	903	117	From		feet to		teet
11/14==/ 4			1		9.		WATER LEVEL		
- 1	1					r level			w land surface
desideto	ba					ow			P.S.I.
Sec. 1094 8330	ZA	or al	pandor	men	Water temp		°F Quality		
			_	1	10.		LLER'S CERTIFIC		
Date started April 22				200	This well y	was drilled ut knowledge.	nder my supervision	and the repor	t is true to the
Date completed May 17				280	) Cost of the	10/75	70		
	TEST D	ATA				ayNo	Contractor	0	7:
TEST METHOD: D		☐ Pump	☐ Air	Lift	Address)	2030 E	ast Rigg	s Kon	ط
1		1	Dime (H		Cha.		A 2 . 8	5249	
G.F.M. (Fee	t Below St	atic) ( North	- 11	ours)	Nevada co	ntractor's lic	ense number	1910	)
	-/-	JU1: 4	2001		Nevada di	iller's licens	contractor's Board e number issued by	the ,	339
	()	70,	41		Division	of Water Re	esources, the on-site	driller	) /
		160	5007	/ -	Signed	By drille	r performing actual dril	ling on site or co	entractor
					Date	5-19	~ 01		

### Nevada Division of Water Resources

Well Log Database

RW-1

### **Query Results**

Type of Site: N

Log No.: 83508

Sequence No.: 62251

Permit No.: 60022

Basin: 216

Notice of Intent#: 22197

Owner: NEVADA POWER COMPANY

Mailing/Well Address: 17283 N LAS VEGAS BLVD

Location NW SW

Sec: 21 Twn: 17S

Rng: 64E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.: 083-20-000-002

Lot No.:

Block No.:

Well Construction

Type of Work: S

Depth to Bedrock:

Proposed Use: P

After Hours Pump: 45

Drilling Method R

Subdiv. Name:

Source Agency: NV003

Hole Depth: 870 feet

Construction Data Quality: G

Surface Casing Diameter: 12 inches

Lithologic Data Quality: G

Cased To: 833 feet Casing Reductions: 0

Aquifer Type:

Perforations:

Date Started: 6/7/2001

From 553 feet to 833 feet

Date Complete: 7/3/2001 Yield 90 G.P.M.

Perforation Length: Perforation Intervals: 1

Draw Down: 2

Depth of Seal: 500 feet

Pumping Water Level:

Gravel Packed: Y

Specific Capacity: Test Method: A

from 500 feet to 870 feet

Work Type Remarks:

Static Water Level: 260 ft below LSD

Water Temperature: 83° F

General Remarks:

Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

Additional Remarks:

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Drir No.: Driller Lic.No.: 1339

**Code Definitions** 

### List of Wells in Hidden Valley

Site Name	Alias	Owner
SHV-1*	363308114553001	Dry Lake Water

<sup>\*</sup> Could not obtain drill log



Survey measurement point is an 'X' on southeast corner of concrete pad; DTW MP is top of casing inside vault.

Well SHV-1 in Hidden Valley prior to setting up a GPS data gathering station

#### SHV-1

Well SHV-1 in Hidden Valley, Clark County, is adjacent to U.S. Highway 93, approximately 16.5 miles south of the intersection of U.S. Highway 93 and State Route 168 (figure 1).

This well was drilled sometime before 1958 on U.S. Bureau of Land Management land, apparently for use as a stock well, and is now abandoned. The well was plugged above the water table until the Geological Survey redrilled it to a depth of 920 feet in December 1985. The water table is 832.3 feet below the land surface. The caliper log indicates 5-inch-diameter casing to a depth of 45 feet and 6-inch uncased hole below. The drilling history and well construction are unknown. Geophysical well logs of this well are shown in figure 28.

(Source: Berger and others, 1988).

### List of Wells and Stream Gages in the Muddy River Springs Area

Site Name	Alias	Owner		
ABBOTT	UM7	Nevada Power Company		
BEHMER-MW	Behmer monitoring well	Nevada Power Company		
CSV-1	364601114554401	USGS		
CSV-2	364650114432001	USGS		
EH-4		Nevada Power Company		
EH-5B		Nevada Power Company		
IVERSON FLUME	09415927	Joint*		
LDS CENTRAL	UM49	Nevada Power Company		
LDS EAST	UM50	Nevada Power Company		
LDS WEST	UM18	Nevada Power Company		
LEWIS 1 OLD	NPC Old; UM55	Nevada Power Company		
LEWIS 2M	UM74	Nevada Power Company		
LEWIS NORTH	UM45	Nevada Power Company		
LEWIS SOUTH	UM43	Nevada Power Company		
MUDDY SPRING GAGE	09415900	Joint*		
MX-6	CE-DT-6; 364604114471301	Moapa Valley Water District		
PEDERSON SPRING				
GAGE	09415910	Joint*		
PERKINS OLD	UM15	Nevada Power Company		
PEDERSON EAST GAGE	Playboy Pool Gage; 09415908	Joint*		
WARM SPRINGS WEST GAGE	09415920	Joint*		

<sup>\*</sup> Funded and installed by any combination of these agencies: Moapa Valley Water District Nevada Division of Water Resources Nevada Power Company Southern Nevada Water Authority U.S. Fish and Wildlife Service U.S. Geological Survey



Survey measurement point is top of brass monument on concrete pad; DTW MP is top of well casing inside vault

ABBOTT Well in Muddy River Springs Area prior to setting up GPS station

### DIVISION OF WATER RESOURCES

### WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY	
Log No	
Log No Permit No. 7557	
Basin	

1. OWNER Stowell a	blott.	DDRESS Maya, nimile
2. LOCATION NE 4 3 W 1/4 PERMIT NO 285 23	Sec. 1.4 T. 1.4	N/S R & 5 E County
3. TYPE OF WORK  New Well Recondit  Deepen Other	ion Domestic Municipal	
6. LITHOLOGIC I  Material Wate Strate	From To Thickness	8. WELL CONSTRUCTION  Diameter hole
Soyl Clay Soyl Clay Sand Clay	0 8 8 27 27 35 35 42 42 48 48 66 66 70	Weight per foot
Sand Dranck Sand Think Voy	70 74 74 86 81 100 106 166	inches feet  Surface seal: Yes No Type FLLIA Gravel packed: Yes No Gravel packed from Scient feet  Perforations:  Type perforation.
	RECEIVED	Size perforation         /6           From         50         feet to         60         fee           From         feet to         fee         fee           From         feet to         fee           From         feet to         fee           From         feet to         fee
	DIV of Water Resources and Office Las Vagas, Nev.	9. WATER LEVEL  Static water level
Date started Lest hol Started Cipi	, 19.7.5	10. DRILLERS CERTIFICATION  This well was drilled under my supervision and the report is true to the best of my knowledge.
1800 150 Lane - Budde	Down After Hours Pump	Name De Miller de Angelon Address De Marie VIII de Angelon Address De Marie VIII de Angelon Address De Marie VIII de Angelon A

PINK-WELL DRILLER'S COPY

### DIVISION OF WATER RESOURCES

Abbott Well

### WELL DRILLERS REPORT

Abbott Well	L		W	ELL I	RILLI	ERS REPORT ()06	Basin 219		<i>J</i>
PRINT OR TYPE	ONLY		P	lease com	plete this	form in its entirety W			1
OWNER	Noveda Por	C-				/	NOTICE OF IN	TENT NO	2255
MAILING ADDRI	revada rov	Offic	e Boy	230		ADDRESS AT WELL LO	CATION Moa	pa v	
MAILING ADDRI	Las Vegas.	Nevad	a 89	151					
2. LOCATION	SE 4	SW 1/4	Sec	14 т	14	SR 65 E	Cla	rk	County
PERMIT NO25	699								County
				Parcel No.			Subdivision Name		
	TYPE OF WOR		_			IAL PROPOSED USE		5. TYPE	
New Well Deepen		condition		2000000	nestic [		Test 🗆		Rotary XX
Deepen	U Oth	iei		Mur	nicipal L	Industrial 🗆	Stock 🗆	Other 🗆	
6.	LITHOL	OGIC LO	G				L CONSTRUCTIO		
Materi	al	Water Strata	From	То	Thick- ness	Diameter hole 175			
Red clav		Strate	0	45	45	Casing record Weight per foot		Thickness	.375
Sand, gravel	& clay		45	60	15	Diameter	From		
Some clay, s			60	80	20	12 3/4 inches	+1feetl	100	feetl
Sand, gravel	, boulders		80	100	20	inches	feet		feet
						inches			
			_			inches			
						inches			
						Surface and Var To			
						Surface seal: Yes 25 Depth of seal 25			
						Gravel packed: Yes		***************************************	Iect
						Gravel packed from	25 feet to	100	feet
						Perforations:			
						Type perforationH	i-Cap Screen		
						Size perforation	080 slot		
			_			From 30			
				-		From			
IVE	CEIV					From			
	CEIV					From			
		zD							
171,4	F21						WATER LEVEL		
Div	- 00					Static water level	12	feet below	land surface
Brench Offi	aler Resource					Flow	G.P.M		P.S.I.
	aler Resource	5	-			Water temperature	° F. Quality		
	144					10. DRILLE	ERS CERTIFICATI	ON	
Date started		Feb	ruarv	28,	10 86	This well was drilled und			ert is true to
Date completed		Mar	ch 19.		19 86	the best of my knowledg	e.	na the repo	it is true to
				***************************************	., 17	Name THOMPSO	N DRILLING CO	INC.	
7.	WELL T	EST DAT	A			4185 W.	Harnfontractor		
	02752765	7				Address Las Veg	as, Nevada 89	103	
Pump RPM	G.P.M.	Draw I		After Hour	s Pump	225 925 VES	Contractor		
	200	5	2	12		Nevada contractor's licens	se number42	86A	
		-				Named	3000-000 AFE	2	
		+				Nevada contractor's drille	rs number58	۷	***************************************
	A Miles die			- 10		Nevada driller's license pu	mber 856 (Gri	ffithel	
	DAIL.	ED TEST					/ / Ac	uml Driller	
0.014	1001100	ER TEST	8		98	Signed Tacker	d K. Th	mp	212
G.P.M		raw down					Contractor	/	-
G.P.M		raw down raw down				DateMarch 20	0, 1986		***************************************
511 1111 manning	D		P		nours				



Survey measurement point is top of well casing at DTW MP

Gathering GPS data on BHMER-MW WELL in the Muddy River Springs Area

	OC AND REPORT TO THE STATE OF NEVADA  Monitoring Well?	TE ROMANIA 19 E POPULA NA 1224
Add Many	Perkins Driller Da.  201, Made Address Pr.  2	
. Permit	12244 Bestfriate no. 40	
ise of drilled hola hickness of cooley	& gange Top of work.	y per limear foot
f fowing well give &	(Chaing 13" in Character and Station first baside Glassocks ow in a.f.s. or g.p.m. and pressures of depth of standing water from surface 8' 2''	r ; ending 13° in Connector give execute Connector
kewing well described	t of well January 17.1958 Dead of complete	ion of well January 22, 195.
From To	Thickness Type of material	Water-bearing Formation, Casing Perforations, Etc.
20 32 32 45 45 80	12 blue clay 13 sandy clay guy in col 35 growd	Chief squifer (water-bearing formation)  from 4.5 to 80 ft.  Other squifers
		Casing perferenced  from 48 to 80 ft
		Sise of perforations  5/2 X 2.

### DIVISION OF WATER RESOURCES

### WELL DRILLERS REPORT

Please complete this form in its entirety

Log No	18 EEPIN	-
Permit	No.29318 + 28	9
Basin.	214 54	

Behmer Well Las Vegas, Ne							
2. LOCATION	IW 14 N	W	Sec. 2	3т.	14	M/S R 65 E Clark	0
PERMIT NO	39	298	F 29	1246	<i></i>		
3.	TYPE OF W	ORK		4.		PROPOSED USE	5. TYPE WELL
New Well		Reconditio	a 🗆	100	mestic	Irrigation   Test	. 네트일랜드 '라이네'라고 네빌었었
Deepen		Other			nicipal [	Industrial Ex Stock	Other
6.	LITHO	LOGIC LO	G			8. WELL CONSTRU	***   TO DESCRIPTION   400   4
Mate	erial	Water Strata	From	To	Thick- ness	Diameter hole 10 inches 7	Total depth 115
brown clay	,		0	10	10	Weight per foot 42.05	Thickness 2"
gray clay			10	20	10	Diameter Prove	To
wel & fine	sand	-	20	60	40	YYXYYY YYYY	XX feet XXXX
cks & 3/4"	gravel	-	60	100	40	16 inches +1	feet 115
cvel			100	116	15	inches	feet
		-				inches	feet
		-				inches	
						inches	feet
		-					pe cement
						Depth of seal 50	
	-	-				Gravel packed: Yes ᡚ No □	
		-				Gravel packed from	feet to 115
						0.1. p-1. 10 10 10 10 10 10 10 10 10 10 10 10 10	
		-				Perforations:	
		-				Type perforation Mills K	nife
		+				Size perforation 3/18 x 3	
		+				Prom. 30 feet to.	80
		+	BF	FFI	WER	Prom 85Screen feet to.	115
		+	KE	CEI	VED	Promfeet to	
•		+	-			Promfeet to	
		+			270	Promfeet to	
			D54		Resources	9. WATER LEV	PI
					Vegas, No.	Static water level 10 Feet	
						Flow G.P.1	
						Water temperature F. Qual	
						10. DRILLERS CERTIF	ICATION
Date started	April 5	••••••			1926	This well was drilled under my supervis	ion and the report is tr
Date completed	ay_20				1926	the best of my knowledge.	
7.	WELL '	TEST DAT	Α :	7.2.		Name Thompson Drilling	g Co., Inc.
Pump RPM	G.P.M.	Draw Do	- /	After Hours	Pump		······································
	1300	24.		2		Address 3215 Cinder Lane	-Las vegas,
	1200	23'		3			12061
	1000	21'				Nevada contractor's license number	+200A
	800	18'	_	6			
	600	16'		8		Nevada driller's license number 581	
		ER TEST		-		some strick N. S.	10
	HAII	ER LEST				a distributed by the	



Survey measurement point is at the DTW MP, the top of broken 4" casing inside vault

Sean, setting up GPS station on Well CSV-1 in the Muddy River Springs Area

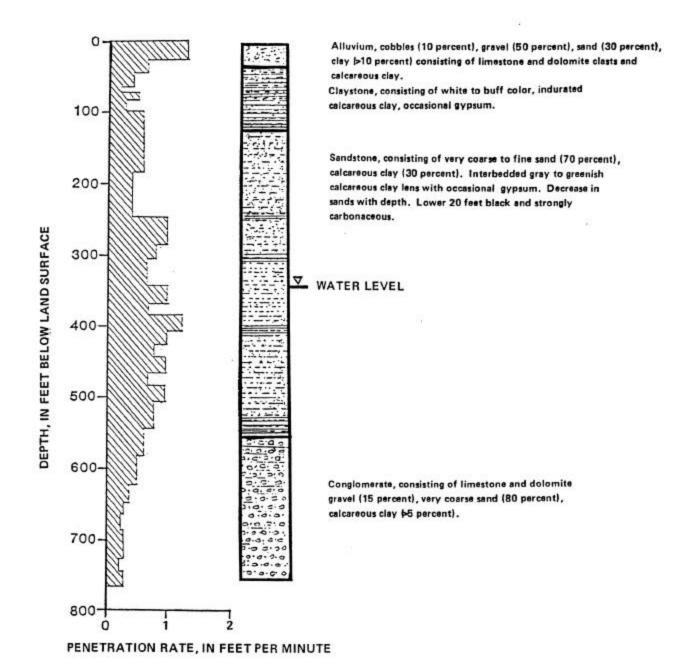
### GEOHYDROLOGIC DATA FROM THE EIGHT WELLS

#### CSV-1

Well CSV-1 is in Moapa Valley, Clark County, and is approximately 1.5 miles south of the intersection of State Route 168 and an abandoned highway (figure 1). The well site is near the intersection of Wildcat Wash and Pahranagat Wash east of the northern edge of the Arrow Canyon Range.

The Geological Survey began drilling on October 10, 1985. The drill penetrated 765 feet of basin-fill sediments and reached ground water at approximately 344 feet below land surface. The drilling penetration rate and lithologic log are shown in figure 2. A shift in the natural gamma and neutron logs near 550 feet indicated possible bedrock and gave reason to attempt a core sample from the well bottom; however, no sample was recovered due to core-barrel damage. The well was cased with two polyvinyl chloride (PVC) piezometers: a 2-inch-diameter piezometer and a 4-inch-diameter piezometer (table 2). A bentonite plug was installed at a depth interval of 362 to 369 feet to prevent leakage along the 4-inch casing. The annulus was then filled with clean gravel pack from 362 feet to the surface plug. Geophysical logs for this well are presented in figure 3.

(Source: Berger and others, 1988).



Drilling penetration rate and lithology for U.S. Geological Survey

test well CSV-1.
(Source: Berger and others, 1988).



Survey measurement point is at top of 12" casing inside vault at green mark, the DTW MP

Gathering GPS data at Well CSV-2 in the Muddy River Springs Area

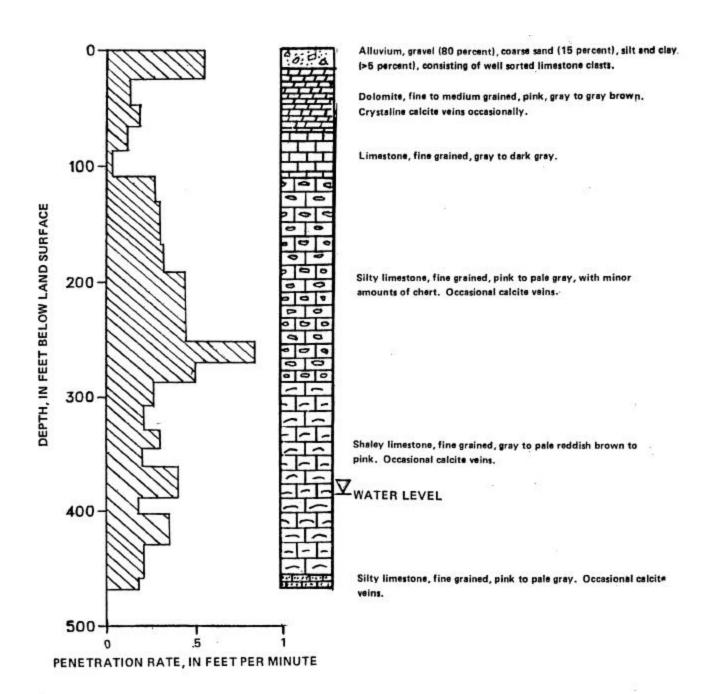
#### CSV-2

Well CSV-2 is in Moapa Valley, Clark County, and is approximately 3.2 miles north of the intersection of State Route 168 and Warm Springs Road (figure 1). The well site is in an unnamed drainage on the southwestern flank of the Meadow Valley Mountains and south of Farrier Wash.

The U.S. Geological Survey began drilling on October 23, 1985. Limestone bedrock was penetrated at 17 feet and the water table was reached at approximately 390 feet below land surface. Drilling continued through the limestone section until October 26, when the 8-footlong drill bit and stem broke off at a depth of 478 feet, after penetrating a large fracture and dropping several feet. Numerous attempts to retrieve the bit and stem were unsuccessful. The well was cased to bedrock with 10-inch-diameter PVC. The drilling penetration rate and lithologic log are shown in figure 4. Geophysical logs are presented in figure 5.

An aquifer test for CSV-2 was made by the Geological Survey in June 1986. Prior to this test, the well was developed by pumping for 2 days at approximately 5,500 gal/d. A 20-horsepower, 6-inch-diameter submersible pump with a 3-inch-diameter discharge pipe was used for the test. The intake was set at 430 feet. A combined total-discharge and sweep-hand flow meter was installed in-line to measure well discharge. Discharge was piped 60 feet from the well to a small wash that transported flow from the site. Water levels were measured in the well with a recording pressure transducer set at 420 feet and calibrated on site. The drawdown test lasted 21 hours with a constant discharge of about 100 gal/min. Total recovery was observed within 1 hour of stopping the pump. Tables 5 and 6 and figures 6 and 7 present the test data.

(Source: Berger and others, 1988).



--Drilling penetration rate and lithology for U.S. Geological Survey test well CSV-2.

(Source: Berger and others, 1988).



Survey measurement point is an 'X' etched onthe flange at the DTW MP

Survey team setting up GPS data gathering station on Well EH-4 in the Muddy River Springs Area

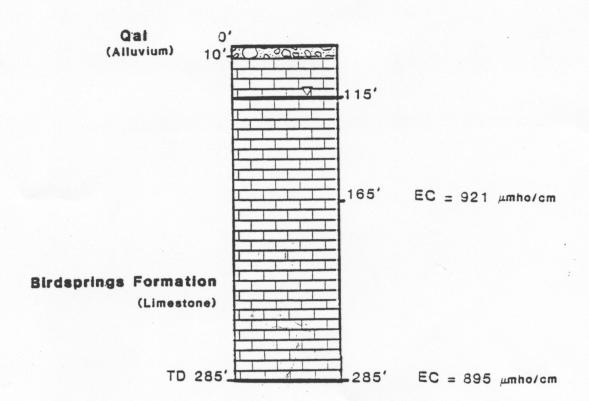
#### Exploration Hole EH-4

EH-4 was commenced on March 17, 1986. The purpose of this hole was to provide a monitoring well near the Muddy Springs in the carbonate aquifers. The hole was completed on March 19, 1986. The geologic formation encountered was limestone underlying fourteen-feet of limestone alluvium. The limestone unit is believed to be the Bird Spring formation. The total depth of the hole is 285 feet (see Figure 10).

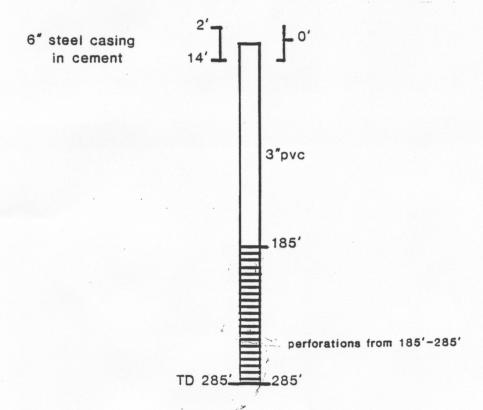
Static water level was measured at 115 feet below land surface. Ground water, during drilling operations, was first sampled at 165 feet. The entire hole was cased with three-inch PVC to 285 feet. The top fourteenfeet of the hole consists of cemented six-inch steel casing. Perforations are in the bottom 100 feet of the PVC casing (see Figure 11). Water quality was good throughout the hole. Electrical conductivity ranged from 895 to 921 µ-mhos. pH ranged from 8.15 to 8.46. Airlift flow rates ranged from 10 to 50 gpm.

The hole was drilled without mud using reverse circulation as the drilling method. The hole is now being monitored for water level changes with a chart recorder.

(Source: Desert Research Institute, 1986)



Well Log for EH-4.
(after Desert Research Institute, 1986)



Well Diagram of EH-4.

(after Desert Research Institute, 1986)



Survey measurement point is an 'X' on flange of welded \_metal plate at DTW MP

Gathering GPS data on Well EH-5B in Muddy River Springs Area

#### Exploration Holes EH-5a and b

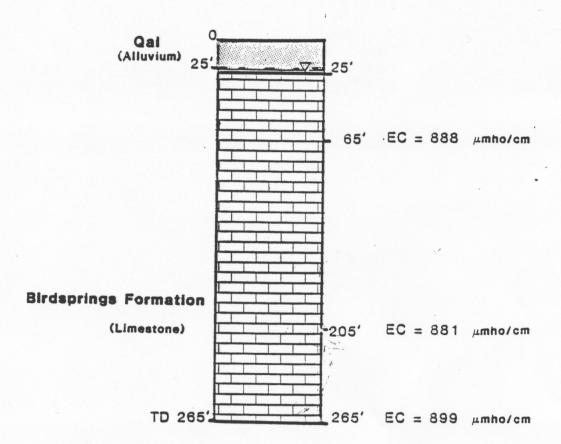
EH-5a was commenced on March 4, 1986. The purpose of the hole was also to monitor water levels in the carbonate aquifers. The hole was abandoned due to the large amount of drilling mud in the hole on March 11, 1986. EH-5b was commenced on March 11, 1986. The hole was completed on March 12, 1986. EH-5b is located 10 to 15 feet north of EH-5a. EH-5b is free of drilling mud and was drilled completely with air.

The lithology encountered is shown in Figure 12. The formation encountered is the Bird Spring formation. It consists of red to grey limestone with calcite vugs. Limestone alluvium was present from the surface to a depth of 25 feet. The total depth of the hole was 265 feet.

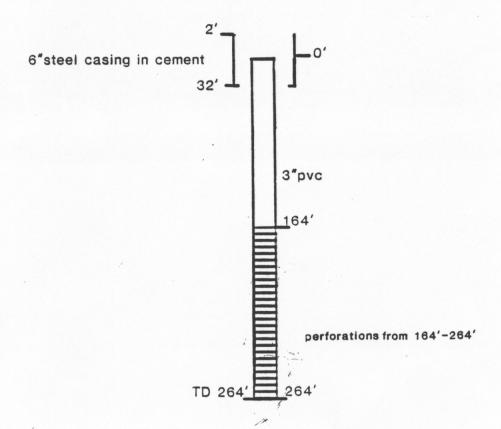
First water was encountered at 65 feet. Water quality was good throughout the hole. Electrical conductivity ranged from 881 to 899  $\mu$ -mhos. pH ranged from 8.10 to 8.32. Airlift rates ranged from 15 to 80 gpm.

Three-inch PVC was used in casing this hole. The casing is perforated from 164 feet to 264 feet (see Figure 13). Static water level was 25 feet below land surface.

(Source: Desert Research Institute, 1986)



Well Log for EH-5b. (after Desert Research Institute, 1986)



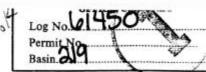
Well Diagram of EH-5b. (after Desert Research Institute, 1986)



Survey measurement point is top of monument on south west of concrete pad; DTW MP is top of 2" access port on south side of big casing

Prior to setting up GPS data gathering station on LDS CENTRAL WELL in Muddy River Springs Area

#### DIVISION OF WATER RESOURCES



## WELL DRILLERS REPORT

i. owner £. DS.	arl	-			DDRESS 71100 pa 7110
					M/S R. 65 E. Plank. Count
	RK econdition ther		1937275	mestic 🗆	[
6. LITHOLO	GIC LOG				8. WELL CONSTRUCTION
Material	Water Strata	From	То	Thick- ness	Diameter hole 26 inches Total depth 16 6 fee
Clay Fine Sand Hord pan You Strand Hord pan You Hond Your Play	X	52 57 58 59 76 73	52 54 58 69 76 83 66	5-2 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7,	Diameter hole
JUN 17 1980					From
Div. of Water Resources Branch Office — Las Veges, Nev.					9. WATER LEVEL  Static water level C Feet below land surface C  Flow G.P.M  Water temperature C F. Quality F.
Date started 3 - 16 Date completed 3 - 36	?				This well was drilled under my supervision and the report is true the best of my knowledge.
7. WELL TE	EST DATA				Name C. 729 Dales
	Draw Down	At	ter Hours	Pump	Address Go V (70 Garaca 70)  Nevada contractor's license number 90 4  Signed Canada Garaca 37
G.P.M	Oraw down Oraw down	fee	ı /	hours hours	Date 4-19-80



Survey measurement point is top of brass monument on south west corner of concrete pad.
DTW MP is top of 2" access port on west side of casing

LDS EAST WELL in Muddy River Springs Area prior to setting up GPS data gathering station.

#### STATE OF HETADA

#### DIVISION OF WATER RESOURCES

LDS EAST WELL?

## **WELL DRILLERS REPORT** (\\\\)0°

Case complete this form in its entirety

Log No. 5 2 48 3	,
Permit No	••••
Basin 219	

LOCATION NW 1/4		Sec//	2T	14	N/S R	5 E			CARK	County
TYPE OF New Well Deepen	WORK Recondition Other			nestic 🔀	PROPOSED Irrigation Industrial	USE	Test Stock	0 0	5. TYPE Cable TO Other	WELL Rotary
LIT	HOLOGIC LO	3			8. 12 10 Diameter hole.	WE	LL CONS	STRUC	TION	95
Material	Water Strata	From	То	Thick- ness	Casing record		2		.: <i>C./.</i> 7. <del>~</del>	X.1.V. V
SRAUEL & CALICH	20'	0'	22'	22'	Weight per foo	ot/		<b>2</b> From	Thicknes	To_
THITE CLAY \$6A	PUEL	221	40'	18'	EIGH		s	0		195 fee
RED CLAY & GRA	VEL	40'	95'	551		inche inche			feetfeet	fee
UHITE CEAY & GRI		95'	140	45'		inche	s		feet	fee
RED CLAY		140'	195	551	Surface seal:				CONCI	
					Depth of seal. Gravel packed:				FTY	fe
				-	Gravel packed	from		fe		
					Perforations:	CASI	NG 1	NOT	PERFE	PRATEL
	RE	F			From					
		766			From					
	JAN		* 6		From					
	· · ·	8 198			From					
	Office	er Kess	4		From		fe	et to		fe
	Office_	tas Vegas	· Ces							
		vegas	Nev.		9.		WATER			21
					Static water le					
		+	-	-	Flow	111	ΛΩτΑ-	G.P.M	[	
					Water temper	ature LAC.	<b>7.7.16</b> %F.	Qualit	ty	
					10.	וואמ	LLERS C	FRLIE	CATION	
Date started				19	This well was					port is true
Date started				19	the best of my			upervisi	ion and the re	port is true
	ELL TEST DA				Name BIL			BI	00D	
Pump RPM G.P.I			After Hour	s Pump	Address/6					AV
					Nevada contr	VEV. E	39030	::1.1 <b>.1.1</b> )	1776	4
								•	798	<i>J</i>
					Nevada drille	r's licens	e number.	1	/ O	
	BAILER TEST				1 1	7///	MI	· NE		



Survey measurement point is top of monument in in concrete N of flume



Survey measurement point is the top of brass monument in northeast corner of concrete pad. DTW MP is 2" access port west of big casing

Gathering GPS data on Well LDS WEST in the Muddy River Springs Area

	0'		Y	VELL	DRI	LLERS REPORT Permit No. 13074
· 3	LDS West		P	Please con	nplete	this form to the and
)	1. OWNER Hya	hes Tool C	omp.	Pun		ADDRESS WARM Spring RANCH
	2. LOCATION 3 W PERMIT NO. 130	74 Re	Sec 9	mew.	+ 4	Sell X8R 65 B Clark Cou
	3. TYP	E OF WORK			A	
	New Well Deepen	Recondition Other			omestic unicipal	
		LITHOLOGIC LOG	}			8. WELL CONSTRUCTION
	Material	Water Strata	Prom .	То	Thick ness	b. Diameter hole
	Sandy soil		10	10	70	Weight per foot
					1 4	Prom To
	bottom is c	emented				inches O feet 80 fo
_						inches feet
-						inches feet feet
_				-		inches
-						Surface seal: Yes   No M Time
					·	Depth of seal feed Gravel packed: Yes □ No ★
} _						Gravel packed from feet to feet
						Perforations:
						Type perforation. Torch
						Size perforation. 1/4 X 10
_	;					From fort to
_						From feet to feet  From feet to feet
						From feet to feet
						From feet to feet
						9. WATER LEVEL
_					-	Static water level
						G D W 12/17
_						Water temperature Working F. Quality
	te started Oct. 7 te completed NaU, 2	≀6		, 19.6	8	10. DRILLERS CERTIFICATION  This well was drilled under my supervision and the report is true to the best of my knowledge.
7.	WI	ELL TEST DATA				Name Darell H. FREE
7	Pump RPM   G.P.I	M. Draw Down	After ]	Hours Pump	p	
- OC !	-00		15			Address PANACA NEVADA
						Nevada contractor's license number 3 422
		1				Nevada driller's license number 30
		BAILER TESTIO				Signed Dane 117
G.P.1		Draw down		hou	urs	O THE
G.P.1		Draw down		hou	11.8	Date Dec 2-68
				hou	urs	
			USE ADD	JITIONAL.	SHEET	S IF NECESCARY

#### **Nevada Division of Water Resources**

#### **Well Log Database**

#### **Query Results**

Log No.: 62880

Type of Site: N

Sequence No.: 40773 **Permit No.: 13074** 

**Basin**: 219

Notice of Intent#: 0

Owner: HUGHES TOOL COMPANY

Mailing/Well Address: WARM SPRINGS RANCH

**Location SW SW** Sec: 09 Twn: 14S Rng: 65E Ref: MD State/Co. Code: 32

Waiver No: Parcel No.: Lot No.: **Block No.:** Type of Work: S Proposed Use: | **Drilling Method** C Subdiv. Name:

Source Agency: NV003 **Well Construction** 

Depth to Bedrock: Hole Depth: 80 feet

Construction Data Quality: G Surface Casing Diameter: inches

Lithologic Data Quality: G Cased To: 80 feet **Aquifer Type:** Casing Reductions: 0

Date Started: 10/7/1968 Perforations:

**Date Complete:** 11/26/1968 From 10 feet to 80 feet

Yield 1300 G.P.M. **Perforation Length: Draw Down:** 5 After Hours Pump: 15 Perforation Intervals: 1

**Pumping Water Level:** Depth of Seal: feet **Specific Capacity: Gravel Packed: N** Test Method: U from 0 feet to 0 feet

**Work Type Remarks:** Static Water Level: 16 ft below LSD

Water Temperature: 9 F

General Remarks: **Contractor Name: DARELL H FREE** 

Contractor License Number: 3422

**Additional Remarks:** Address: P O BOX 122 PANACA NV 89042

> Contractor's Drlr No.: Driller Lic.No.: 30



Survey measurement point is an 'X' etched in casing at DTW MP above white mark

Lewis 1 OLD Well in Muddy River Springs Area prior to setting up GPS station

## WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

Rec. 718 1947
Well-Norman Permit No. 12 7 76
Do not fill in

Owner C/	rence	2 Clark	ed A. Lowes Driller Clo	rence Lewis
			Address	MC.
Location of	well: New	1/4. <i>nle</i> .1/4 S	ec.8 , T. 14 X/S, R65 E, in	ck Coun
or Well	636'IV.	E. of P	of Dio. Shown on map	
Water will	be used for.	150196	fron & clom. Total depth	n of well 571/2'
Size of dri	lled hole	12"		linear foot
Thickness o	of casing		Temp. of water	70.
Diameter a	nd length of	casing (Casing	/2" - 37/2 12" in diameter and under give inside diameter; ca	asing 12" in diameter give outside diameter.
			g.p.m. and pressure	
If nonflowi	ng well give	depth of st	anding water from surface	
Date of cor	nmencement	of well	(Type and size of v	f well /16 1949
Type of we	at fig		OF FORMATIONS	
From feet	To feet	Thickness feet	Type of material	Water-bearing Formation, Casing Perforations, Etc.
0	28	7	clay a rocks	Chief aquifer (water-bearing formation)
28	28 1/2	1/2	gravel with water	from 3/ to 55 ft.
28/2	31	2 1/2	clay a rocks	Other aquifers
31	4	24	gravel - water	28-28/2
55	07 12	2 1/2	clay - stopped on big white bodder	
				First water at 28 1/2 feet.
				Casing perforated from 42 2 to 54 2 ft
				Size of perforations  1/4 × 10°-  Forand casing.
			(OVER)	

1 011



Survey measurement point is top of brass monument southwest of concrete pad.

DTW MP is top of casing inside vault

Gathering GPS data at LEWIS 2M (monitoring) Well in the Muddy River Springs Area

#### Nevada Division of Water Resources

#### Well Log Database

#### **Query Results**

Type of Site: N Log No.: 5154

Sequence No.: 40756 Permit No.: 17754

Basin: 219

Notice of Intent#: 0

Owner: LEWIS, CLARVID Mailing/Well Address:

Location SE NE Sec: 08 Twn: 14S Rng: 65E Ref: MD State/Co. Code: 32

Waiver No: Parcel No.: Lot No.: Block No.: Type of Work: N Proposed Use: | Drilling Method C Subdiv. Name:

Source Agency: NV003 Well Construction

Depth to Bedrock: Hole Depth: 66 feet

Construction Data Quality: G Surface Casing Diameter: inches

Lithologic Data Quality: G Cased To: 66 feet

Aquifer Type: Casing Reductions: 0

Date Started: 7/7/1959 Perforations:

Vield 600 G.P.M. Perforation Length:

After Hours Pump: Perforation Intervals: 1

Draw Down: After Hours Pump: Perforation Intervals: 1
Pumping Water Level: Depth of Seal: feet
Specific Capacity: Gravel Packed:
Test Method: T from 0 feet to 0 feet

Work Type Remarks: Static Water Level: 16 ft below LSD

Water Temperature: ° F

General Remarks: Contractor Name:

Contractor License Number:

Additional Remarks: Address:

Contractor's Drlr No.: Driller Lic.No.: 192

**Code Definitions** 



Survey measurement point is an "X" on — top of casing flange at pink mark, the DTW MP

Gathering GPS data on LEWIS NORTH WELL in Muddy River Springs Area

# WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

Ur	TATE A	ADA	

1 CHILL TVO.	_
Permit No.	
Well No	
Rec19	,

3/16 X 3" 4 rows

V	PLEAS	E COMPLET	E THIS FORM IN ITS ENTIRETY	Do not fill in.
Owner N	EVADA J	POWER CO	• Driller Patrick	H. Thompson
Address I	as: Vega	as. Neva	da Address Las Veg	as, Nevada Lic. No.192
L' ocation of	well:	41/4 Sec.	8 ,74 N/S, R6) E, in Cla	rkCounty
or Cla	rvid L	ewis pro	perty near Glendale, Nevada	
Water will h	e used for.	obser	vation Total depth	of well70!
Size of drille	ed hole8	5/8"	Weight of casing per l	inear foot. 12#
			Temp. of water COC	
Diameter at	d length of	f casing 8	(Casing 12" in diameter and under give inside diameter; ca	100 1- 11- 11- 11- 11- 11- 11- 11- 11- 1
		***	······································	
If flowing w	ell give flov	w in c.f.s. or	g.p.m. and pressure	· · · · · · · · · · · · · · · · · · ·
			nding water from surface	
			S(Type and size o	
Date of con	nmencemen	t of well	April 23/2. 1964. Date of completion o	f wellApril 29, 1964
Type of we	11 rig	cable to	ools	
		LOG	OF FORMATIONS	Water-bearing Formation, Casing
From feet	To feet	Thickness feet	Type of material	Perforations, etc.
0.	14.	4	Brown clay and gravel	Chief aquifer (water-bearing formation)
4 50	50. 70.	46	Gravel Cemented gravel	from 32 to 50 ft
90	70.		0	Other aquifers 50 - 70
				First water at32feet.
				Casing perforated
			, , , , ,	from 28 to 68 ft
				Size of perforations

#### **Nevada Division of Water Resources**

Lewis North

Well Log Database

#### **Query Results**

Type of Site: N

Log No.: 62873

Sequence No.: 40764

Permit No.:

Basin: 219

Notice of Intent#: 0

Ref: MD

Surface Casing Diameter: 8.62 inches

Owner: NEVADA POWER COMPANY

Mailing/Well Address:

Location

Sec: 08

Twn: 14S

Rng: 65E

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Well Construction

Type of Work: N

Proposed Use: X

**Drilling Method C** 

Hole Depth: 70 feet

Cased To: 70 feet

Perforations:

Subdiv. Name:

Source Agency: NV003

Depth to Bedrock:

Construction Data Quality: G

Lithologic Data Quality: G

Aquifer Type:

Date Started: 4/23/1964

Pumping Water Level:

Work Type Remarks:

Specific Capacity:

General Remarks:

Additional Remarks:

Test Method: B

Date Complete: 4/29/1964

Yield 70 G.P.M.

Draw Down:

After Hours Pump:

Pe

From 28 feet to 68 feet Perforation Length:

Perforation Intervals: 1

Casing Reductions: 0

Depth of Seal: feet Gravel Packed:

from 0 feet to 0 feet

Static Water Level: 28 ft below LSD

Water Temperature: ° F

**Contractor Name:** 

Contractor License Number:

Address:

Contractor's Drlr No.:

Driller Lic.No.: 192

**Code Definitions** 



An offset survey measurement was made to the top of a brass monument on the north side of Warm Springs Road. A level was used to measure from there to the base of the welded metal on top of well, the DTW MP.

LEWIS SOUTH WELL in Muddy River Springs Area. An offset measurement was made on this well from Warm Springs Road; a level was later used to measure to the base of the welded plate.

(	7
1	1
1	7

#### OF NEVADA

Well No	
Permit No	

PLEACE	COMPLETE	THIC	FODM	TAI	TTC	PARTIDETV
LUDROD	COMIT DELL	TATALO	I. OTCAI	77.4	110	CIVILICII

Do not hil in.
Thompson

Owner NEVADA POWER CO.	Driller Patrick H. Thompson			
	Address Las Vegas, Nevada Lic. No.192			
	E, in Clark County			
or Clarvid Lewis property near Glendale, Navada				
Water will be used for Xxxxxxxxxx observation Total depth of well 115!				
	Weight of casing per linear foot			
· · · · · · · · · · · · · · · · · · ·	Temp. of water COOL			
Diameter and length of casing 8 5/811. X 111.1  (Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter.)				
	gro outside traineter.)			
If nonflowing well give depth of standing water from surface. 171-				
If flowing well describe control works				
	(Type and size of valve, etc.)			
Date of commencement of well April 16, 1964	Date of completion of well April 22, 1964			
Type of well rig. Cable toolls				

LOG OF FORMATIONS		Water		
From feet	To feet	Thickness feet	Type of material	Water-bearing Formation, Casing Perforations, etc.
0 20 44 85 100 105	20 44 85 100 105 115	20 25 41 15 5 10	Brown sandy clay Sand and gravel Brown clay Blue clay Red clay Limestone	Chief aquifer (water-bearing formation)  from. 20 to 11 ft.  Other aquifers. none
				First water at 20 feet.  Casing perforated  from to ft.  Size of perforations  3/16 X 3!! 4 rows



Survey measurement point is the top of brass monument in concrete pad inside building; DTW MP is top of 2" access port beside big casing.

Gathering GPS data on Well MX-6 (CE-DT-6) in the Muddy River Springs Area

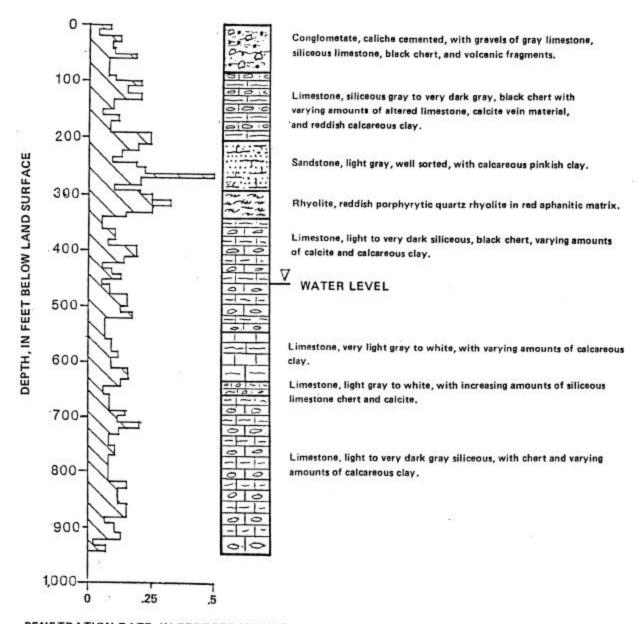
#### CE-DT-6

Well CE-DT-6 is in Moapa Valley, Clark County, adjacent to State Route 168 approximately 6.7 miles east of CE-DT-5 (figure 1). The well site is in the southern portion of the Meadow Valley Mountains and was drilled as an observation well for use during aquifer tests at CE-DT-5. Limestone bedrock and the water table were reached at 78 and 457.4 feet below the land surface, respectively.

Drilling began on May 21, 1981, and was completed on June 3, 1981. A total depth of 937 feet was attained. Eighty-seven feet of 12-3/4-inch surface casing was cemented into place and 8-5/8-inch well casing was installed from land surface to the bedrock. The drilling penetration rate and lithologic log are shown in figure 19. Temperature and caliper logs are shown in figure 20.

Water levels measured from October 28, 1985, to January 28, 1986, for this well are presented in graphic form in figure 21. The Geological Survey made a 66-hour constant-discharge aquifer test December 6-12, 1986. Drawdown data are listed in table 10 and shown in figure 22. Recovery data are listed in table 11 and shown in figure 23. Water levels were measured with a recording pressure transducer calibrated onsite. Total recovery occurred within 5 minutes after the pump was turned off.

(Source: Berger and others, 1988).



PENETRATION RATE, IN FEET PER MINUTE

.-Drilling penetration rate and lithology for MX test well CE-DT-6. (Source: Berger and others, 1988).



Survey measurement point is the top of a 5/8-inch hex bolt in the concrete rim (north) of the pool

PEDERSON GAGE in Muddy River Springs Area prior to setting up GPS station



Survey
measurement
point is the top \_
of casing inside
concrete
vault at DTW MP

Gathering GPS data on PERKINS OLD Well in the Muddy River Springs Area

Page 1 of 1 wlog number

#### Nevada Division of Water Resources

Well Log Database

Perkins Old

#### Query Results

Type of Site: N Log No.: 327

Permit No.: 12679 Sequence No.: 39218

Basin: 219

Notice of Intent#: 0

Owner: PERKINS, U V Mailing/Well Address:

Sec: 22 Twn: 14S Location NE NW Rng: 65E Ref: MD State/Co. Code: 32

Waiver No: Parcel No.: Block No.: Lot No.: Type of Work: N Proposed Use: I **Drilling Method C** Subdiv. Name:

Well Construction Source Agency: NV003

Depth to Bedrock: Hole Depth: 150 feet

Construction Data Quality: G Surface Casing Diameter: 10 inches

Lithologic Data Quality: G Cased To: 70 feet Casing Reductions: 0 Aquifer Type:

Date Started: 12/16/1947 Perforations:

Date Complete: 12/21/1947 From 27 feet to 48 feet Perforation Length: Yield G.P.M.

Perforation Intervals: 1 Draw Down: After Hours Pump: Depth of Seal: feet Pumping Water Level: Specific Capacity: Gravel Packed: from 0 feet to 0 feet Test Method:

Work Type Remarks: Static Water Level: 21 ft below LSD

Water Temperature: ° F

General Remarks: Contractor Name:

Contractor License Number:

Additional Remarks: Address:

> Contractor's Drlr No.: Driller Lic.No.: 43

**Code Definitions** 



Survey measurement point is the top of brass monument on southwest corner of flume.

PEDERSON EAST GAGE (Playboy Pool Gage) in Muddy River Springs Area



An offset measurement was made at this site due to tree cover; Survey measurement point is the top of gage in flume at the 3.0 feet. mark.

WARM SPRINGS WEST GAGE in Muddy Springs Area

#### APPENDIX B

## NATIONAL GEODETIC SURVEY OPUS SOLUTION REPORT FOR THE VARIOUS SURVEYED POINTS

### NGS OPUS SOLUTION REPORT

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: apx21371.020 TIME: 00:15:52 UTC

BM-DL-2 (Apex-2)

SOFTWARE: page5 0203.19 START: 2002/05/17 18:42:00
EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 20:44:00
NAV FILE: brdc1370.02n OBS USED: 5228 / 5334 : 98%
ANT NAME: TRM33429.00-GP # FIXED AMB: 35 / 37 : 95%

ARP HEIGHT: 1.426 OVERALL RMS: 0.015(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3749)

X: -2166325.790 (m) 0.002 (m) -2166326.436 (m) 0.003 (m) Y: -4668647.768 (m) 0.015 (m) -4668646.462 (m) 0.015 (m) Z: 3755750.167 (m) 0.019 (m) 3755750.148 (m) 0.020 (m)

LAT: 36 18 9.91305 0.017(m) 36 18 9.93009 0.018(m)
E LON: 245 6 28.65754 0.006(m) 245 6 28.61201 0.007(m)
W LON: 114 53 31.34246 0.006(m) 114 53 31.38799 0.007(m)
EL HGT: 730.675(m) 0.016(m) 729.928(m) 0.016(m)

ORTHO HGT: 758.207(m) 0.030(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4019590.988(m) EASTING: 689269.518(m)

SPC: Zone 2701 (NV)
NORTHING: 8172482.955 (m)
EASTING: 262084.731 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 31257

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 187512

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 144797

NEAREST NGS PUBLISHED CONTROL POINT

GR1885 APEX N361920 W1145543 3932

This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

#### NGS OPUS SOLUTION REPORT \_\_\_\_\_

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: apx11370.020 TIME: 00:16:46 UTC

BM-DL-1 (Apex-1)

ANT NAME: TRM33429.00-GP

START: 2002/05/17 18:20:00 SOFTWARE: page5 0203.19 STOP: 2002/U5/I/ 20.22 OBS USED: 5293 / 5470 : 97% EPHEMERIS: igs11665.eph [precise] NAV FILE: brdc1370.02n

ARP HEIGHT: 1.207 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3748)

-2165758.049 (m) 0.012 (m) -2165758.695 (m) 0.013 (m) Х: -4668979.073(m) 0.018(m) -4668977.767 (m) 0.018 (m) Z: 3755656.215(m) 0.007(m) 3755656.197(m) 0.008(m) LAT: 36 18 6.27382 0.018(m) 36 18 6.29087 0.019(m)

E LON: 245 6 54.88526 0.004(m)245 6 54.83975 0.005 (m)114 53 5.16025 W LON: 114 53 5.11474 0.004 (m) 0.005(m)EL HGT: 724.696 (m) 0.013 (m) 723.950 (m) 0.013 (m)

752.229(m) 0.028(m) [Geoid99 NAVD88] ORTHO HGT:

UTM: Zone 11 4019493.118 (m) NORTHING: EASTING: 689926.208 (m)

Zone 2701(NV) SPC: 8172375.488 (m) NORTHING: EASTING: 262739.856 (m)

#### BASE STATIONS USED

LATITUDE LONGITUDE DESIGNATION DISTANCE (m) N360934 W1151128 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP 31767 AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 187428 AM7015 king KINGMAN CORS ARP N351150 W1140229 144353

#### NEAREST NGS PUBLISHED CONTROL POINT

N361945 W1145538 4882 GR0624 P 171

This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

#### NGS OPUS SOLUTION REPORT \_\_\_\_\_\_

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002

RINEX FILE: cev11421.020 TIME: 00:19:34 UTC

CE-VF1

START: 2002/05/22 18:20:00 SOFTWARE: page5 0203.19 EPHEMERIS: igs11673.eph [precise] STOP: 2002/05/23 00:21:00 OBS USED: 15438 / 15540 : 99% NAV FILE: brdc1420.02n ANT NAME: TRM33429.00-GP # FIXED AMB: 55 / 55 : 100%

ARP HEIGHT: 0.924 OVERALL RMS: 0.014(m)

REF FRAME: NAD83(CORS96)(EPOCH:2002.0000) ITRF00 (EPOCH:2002.3887)

X:	-2154774.562 (m)	0.005 (m)	-2154775.210 (m)	0.007 (m)
Y:	-4632226.416 (m)	0.007 (m)	-4632225.116 (m)	0.007 (m)
Z:	3806791.851 (m)	0.015 (m)	3806791.837 (m)	0.015 (m)
LAT:	36 52 32.05953	0.014 (m)	36 52 32.07678	0.016(m)
E LON:	245 3 12.76539	0.002 (m)	245 3 12.71953	0.004(m)
E LON:	114 56 47.23461	0.002 (m)	114 56 47.28047	0.004 (m)
EL HGT:	726.106(m)	0.005(m)	725.373(m)	0.005(m)

ORTHO HGT: 752.350(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 4083038.012(m) NORTHING: 683024.807 (m) EASTING:

SPC: Zone 2701 (NV) 8236009.852(m) NORTHING: 256776.581 (m) EASTING:

#### BASE STATIONS USED

PID DESIGNATION	LATITUDE LONGITUDE	DISTANCE (m)
AI8811 rail RAILROAD VALLEY CORS ARP	N381649 W1153953	168367
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP	N360934 W1151128	82447
AI8817 echo ECHO CANYON S.P. CORS ARP	N375455 W1141551	130298

### NEAREST NGS PUBLISHED CONTROL POINT

GR1913 HIGHWAY 93 STA A 24+69.47 POT N365136 W1145725 1969

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002
RINEX FILE: bemr1351.020 TIME: 00:20:29 UTC

RINEX FILE: bemr1351.020
Behmer-MW

SOFTWARE: page5 0203.19 START: 2002/05/15 20:49:00
EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 23:05:00

NAV FILE: brdc1350.02n OBS USED: 4498 / 6261 : 72%

ANT NAME: TRM39105.00 # FIXED AMB: 47 / 53 : 89%

ARP HEIGHT: 1.237 OVERALL RMS: 0.022(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3696)

X: -2138784.121(m) 0.019(m) -2138784.767(m) 0.020(m) Y: -4651480.771(m) 0.013(m) -4651479.468(m) 0.013(m) Z: 3792017.285(m) 0.007(m) 3792017.268(m) 0.007(m)

LAT: 36 42 39.17119 0.006(m) 36 42 39.18846 0.006(m) E LON: 245 18 24.08454 0.012(m) 245 18 24.03895 0.015(m) W LON: 114 41 35.91546 0.012(m) 114 41 35.96105 0.015(m) EL HGT: 496.730(m) 0.020(m) 495.987(m) 0.020(m)

ORTHO HGT: 523.614(m) 0.032(m) [Geoid99 NAVD88]

UTM: Zone 11

NORTHING: 4065280.181(m)

EASTING: 706030.703(m)

SPC: Zone 2701(NV)
NORTHING: 8217915.107(m)
EASTING: 279514.388(m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75758

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139027

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 177953

NEAREST NGS PUBLISHED CONTROL POINT

GR0789 K 301 N364305 W1144133 802

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 TIME: 00:24:01 UTC

RINEX FILE: cev21421.020

CE-VF-2

START: 2002/05/22 18:36:00 SOFTWARE: page5 0203.19 STOP: 2002/05/22 23:47:00 EPHEMERIS: igs11673.eph [precise] NAV FILE: brdc1420.02n OBS USED: 12185 / 12336 : 99% ANT NAME: TRM33429.00-GP # FIXED AMB: 45 / 47 : 96%

ARP HEIGHT: 1.298 OVERALL RMS: 0.014(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3887)

> -2154830.280 (m)0.008(m)-2154830.927(m) 0.010(m)Х: -4632296.774 (m) 0.011 (m)-4632295.473 (m) 0.010 (m) 3806675.487 (m) 0.018 (m) 3806675.472(m) 0.019(m)Z:

0.020(m)LAT: 36 52 27.34114 0.019(m)36 52 27.35840 E LON: 245 3 11.92384 0.003(m)245 3 11.87799 0.005(m)W LON: 114 56 48.07616 0.003(m) 114 56 48.12201 0.005(m)EL HGT: 726.109(m) 0.011(m) 725.375 (m) 0.011 (m)

ORTHO HGT: 752.353(m) 0.027(m) [Geoid99 NAVD88]

UTM: Zone 11 4082892.145 (m) NORTHING: EASTING: 683007.099(m)

SPC: Zone 2701(NV) 8235864.274 (m) NORTHING: 256756.711(m) EASTING:

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE (m) AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 168494 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 82301 AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 130436

NEAREST NGS PUBLISHED CONTROL POINT

GR1913 HIGHWAY 93 STA A 24+69.47 POT N365136 W1145725 1832

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: csv11420.020 TIME: 00:24:46 UTC

CSV-1

SOFTWARE: page5 0203.19 START: 2002/05/22 20:01:00 EPHEMERIS: igs11673.eph [precise] STOP: 2002/05/22 23:33:00 NAV FILE: brdc1420.02n OBS USED: 8214 / 8322 : 99% ANT NAME: TRM33429.20+GP # FIXED AMB: 37 / 38 : 97%

ARP HEIGHT: 2.064 OVERALL RMS: 0.012(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3888)

X: -2150319.306 (m) 0.004 (m) -2150319.954 (m) 0.004 (m) Y: -4641869.341 (m) 0.007 (m) -4641868.039 (m) 0.007 (m) Z: 3797458.440 (m) 0.019 (m) 3797458.424 (m) 0.020 (m)

LAT: 36 46 16.14798 0.020(m) 36 46 16.16522 0.020(m)
E LON: 245 8 39.62450 0.004(m) 245 8 39.57874 0.004(m)
W LON: 114 51 20.37550 0.004(m) 114 51 20.42126 0.004(m)
EL HGT: 631.942(m) 0.006(m) 631.204(m) 0.007(m)

ORTHO HGT: 658.443(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4071630.410(m) EASTING: 691377.996(m)

SPC: Zone 2701 (NV)
NORTHING: 8224480.661 (m)
EASTING: 264959.032 (m)

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 182168
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 74255
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 137420

NEAREST NGS PUBLISHED CONTROL POINT

GR0799 W 301 N364736 W1145120 2469

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: csv21420.020 TIME: 00:28:02 UTC

CSV-2

SOFTWARE: page5 0203.19 START: 2002/05/22 20:52:00 EPHEMERIS: igs11673.eph [precise] STOP: 2002/05/22 22:54:00 NAV FILE: brdc1420.02n OBS USED: 3970 / 4664 : 85% ANT NAME: TRM39105.00 # FIXED AMB: 39 / 44 : 89%

ARP HEIGHT: 2.045 OVERALL RMS: 0.021(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3888)

LAT: 36 46 50.61146 0.017(m) 36 46 50.62876 0.018(m)
E LON: 245 16 38.12854 0.035(m) 245 16 38.08287 0.043(m)
W LON: 114 43 21.87146 0.035(m) 114 43 21.91713 0.043(m)
EL HGT: 640.522(m) 0.025(m) 639.782(m) 0.025(m)

ORTHO HGT: 667.110(m) 0.035(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4072966.777 (m) EASTING: 703217.083 (m)

SPC: Zone 2701 (NV)
NORTHING: 8225641.415 (m)
EASTING: 276815.215 (m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 80733

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 132361

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 186139

NEAREST NGS PUBLISHED CONTROL POINT

GR0793 Q 301 N364528 W1144533 4132

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 TIME: 00:28:59 UTC

RINEX FILE: csv31421.020

CSV-3

START: 2002/05/22 17:52:00 SOFTWARE: page5 0203.19 EPHEMERIS: igs11673.eph [precise] STOP: 2002/05/22 22:28:00 NAV FILE: brdc1420.02n OBS USED: 10921 / 11056 : 99% ANT NAME: TRM33429.00+GP # FIXED AMB: 50 / 50 : 100%

ARP HEIGHT: 1.100 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3886)

> -2158352.161 (m) 0.002 (m)-2158352.808(m) 0.003(m)X: -4644085.438 (m) 0.002 (m)-4644084.136(m) 0.002(m) 3790364.161(m) 0.018(m) 3790364.145(m) 0.019(m)Z:

LAT: 36 41 27.13392 0.016(m)36 41 27.15111 0.017(m)E LON: 245 4 23.57166 0.002(m)245 4 23.52593 0.003(m)W LON: 114 55 36.42834 0.002(m) 114 55 36.47407 0.003 (m) 709.969(m) 0.008(m) 709.231 (m) 0.009 (m) EL HGT:

ORTHO HGT: 736.376(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 4062583.292 (m) NORTHING: EASTING: 685222.199(m)

SPC: Zone 2701(NV) 8215526.400 (m) NORTHING: 258670.638(m) EASTING:

#### BASE STATIONS USED

DESIGNATION PID LATITUDE LONGITUDE DISTANCE (m) AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 63570 N375455 W1141551 AI8817 echo ECHO CANYON S.P. CORS ARP 148093 183983 AM7015 king KINGMAN CORS ARP N351150 W1140229

NEAREST NGS PUBLISHED CONTROL POINT

GR1910 HIDDEN N364117 W1145233 4559

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: eh401350.020 TIME: 00:33:19 UTC

EH-4

SOFTWARE: page5 0203.19 START: 2002/05/15 19:22:00
EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 21:15:00
NAV FILE: brdc1350.02n OBS USED: 5239 / 5338 : 98%
ANT NAME: TRM33429.00-GP # FIXED AMB: 32 / 33 : 97%

ARP HEIGHT: 1.198 OVERALL RMS: 0.018(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3694)

X: -2140849.743 (m) 0.043 (m) -2140850.389 (m) 0.044 (m) Y: -4650913.164 (m) 0.055 (m) -4650911.861 (m) 0.056 (m) Z: 3791661.212 (m) 0.038 (m) 3791661.195 (m) 0.038 (m)

LAT: 36 42 23.17034 0.035(m)36 42 23.18762 0.036(m)E LON: 245 16 58.92512 0.020(m)245 16 58.87952 0.025(m)W LON: 114 43 1.07488 0.020(m) 114 43 1.12048 0.025(m)562.610 (m) 0.071 (m) 0.071(m)EL HGT: 561.868 (m)

ORTHO HGT: 589.461(m) 0.076(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4064736.407(m) EASTING: 703929.261(m)

SPC: Zone 2701 (NV)
NORTHING: 8217402.539 (m)
EASTING: 277405.434 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 74124

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 140088

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178207

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 2144

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: df101420.020 TIME: 00:33:27 UTC

DF-1 (Dutch Flat-1)

SOFTWARE: page5 0203.19 START: 2002/05/22 19:20:00 EPHEMERIS: igs11673.eph [precise] STOP: 2002/05/22 23:55:00 NAV FILE: brdc1420.02n OBS USED: 10648 / 10861 : 98% ANT NAME: TRM39105.00 # FIXED AMB: 42 / 43 : 98%

ARP HEIGHT: 1.012 OVERALL RMS: 0.013(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3888)

X: -2152370.648 (m) 0.002 (m) -2152371.296 (m) 0.003 (m) Y: -4636213.322 (m) 0.005 (m) -4636212.021 (m) 0.005 (m) Z: 3803198.357 (m) 0.019 (m) 3803198.342 (m) 0.019 (m)

LAT: 36 50 8.16231 0.017(m) 36 50 8.17956 0.018(m) E LON: 245 5 48.57737 0.001(m) 245 5 48.53154 0.003(m) W LON: 114 54 11.42263 0.001(m) 114 54 11.46846 0.003(m) EL HGT: 653.112(m) 0.009(m) 652.377(m) 0.009(m)

ORTHO HGT: 679.466(m) 0.027(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4078687.004(m) EASTING: 686980.163(m)

SPC: Zone 2701 (NV)
NORTHING: 8231600.990 (m)
EASTING: 260666.643 (m)

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 173933
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 79356
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 132569

NEAREST NGS PUBLISHED CONTROL POINT

GR0803 T 302 N365058 W1145218 3202

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 TIME: 00:37:16 UTC

RINEX FILE: qv101370.020

GV-1

START: 2002/05/17 18:19:00 SOFTWARE: page5 0203.19 EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 20:36:00 NAV FILE: brdc1370.02n OBS USED: 6084 / 6192 : 98% ANT NAME: TRM39105.00 # FIXED AMB: 38 / 39 : 97%

ARP HEIGHT: 2.045 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3748)

> -2168093.512(m) 0.006(m) -2168094.159(m) 0.007(m)X: -4658279.430 (m) 0.006 (m)-4658278.125(m) 0.006(m) 3767611.910(m) 3767611.927(m) 0.015(m) 0.015(m)Z:

LAT: 36 26 6.27594 0.017(m)36 26 6.29302 0.017(m)E LON: 245 2 29.09201 0.003(m)245 2 29.04637 0.005(m)W LON: 114 57 30.90799 0.003(m) 114 57 30.95363 0.005 (m) EL HGT: 793.229(m) 0.005(m) 792.487 (m) 0.005 (m)

ORTHO HGT: 820.260(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 4034143.074 (m) NORTHING: 682983.423(m) EASTING:

SPC: Zone 2701(NV) 8187124.446 (m) NORTHING: 256013.261 (m) EASTING:

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE (m) AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 37052 N375455 W1141551 AI8817 echo ECHO CANYON S.P. CORS ARP 175521 160422 AM7015 king KINGMAN CORS ARP N351150 W1140229

NEAREST NGS PUBLISHED CONTROL POINT

GR1892 BIBLE N362524 W1145540 3053

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: eh5b1350.020 TIME: 00:38:08 UTC

RINEX FILE: eh5b1350.02o EH-5B

SOFTWARE: page5 0203.19 START: 2002/05/15 18:18:00 EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 21:54:00 NAV FILE: brdc1350.02n OBS USED: 9529 / 10224 : 93% ANT NAME: TRM33429.00-GP # FIXED AMB: 44 / 55 : 80%

ARP HEIGHT: 1.198 OVERALL RMS: 0.018(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3694)

X: -2142187.171 (m) 0.024 (m) -2142187.818 (m) 0.024 (m) Y: -4648339.453 (m) 0.036 (m) -4648338.151 (m) 0.036 (m) Z: 3793999.895 (m) 0.013 (m) 3793999.879 (m) 0.012 (m)

LAT: 36 43 58.46560 0.023(m) 36 43 58.48287 0.024(m)
E LON: 245 15 26.59487 0.007(m) 245 15 26.54924 0.009(m)
W LON: 114 44 33.40513 0.007(m) 114 44 33.45076 0.009(m)
EL HGT: 535.574(m) 0.039(m) 534.834(m) 0.038(m)

ORTHO HGT: 562.296(m) 0.046(m) [Geoid99 NAVD88]

UTM: Zone 11

NORTHING: 4067619.135(m)

EASTING: 701568.783(m)

SPC: Zone 2701 (NV)
NORTHING: 8220319.470 (m)
EASTING: 275088.164 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75291

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 137956

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 181759

NEAREST NGS PUBLISHED CONTROL POINT

GR0791 N 301 N364418 W1144420 689

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: ldsc1360.020 TIME: 00:40:42 UTC

LDS Central

SOFTWARE: page5 0203.19 START: 2002/05/16 16:53:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 18:57:00 NAV FILE: brdc1360.02n OBS USED: 4610 / 4718 : 98% ANT NAME: TRM39105.00 # FIXED AMB: 35 / 37 : 95%

ARP HEIGHT: 2.045 OVERALL RMS: 0.020(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3719)

X: -2140174.849(m) 0.054(m) -2140175.496(m) 0.053(m) Y: -4649991.542(m) 0.052(m) -4649990.240(m) 0.053(m) Z: 3793074.672(m) 0.038(m) 3793074.655(m) 0.039(m)

LAT: 36 43 21.63168 0.013(m)36 43 21.64895 0.013(m)E LON: 245 17 8.10027 0.029(m)245 17 8.05467 0.035(m)W LON: 114 42 51.89973 0.029(m) 114 42 51.94533 0.035(m)510.296(m) 0.079(m) 0.079(m)EL HGT: 509.555 (m)

ORTHO HGT: 537.104(m) 0.083(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4066543.636(m) EASTING: 704113.959(m)

SPC: Zone 2701 (NV)
NORTHING: 8219206.588 (m)
EASTING: 277616.810 (m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75733

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 138296

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 179821

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 431

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: garn1372.020 TIME: 00:42:20 UTC

Garnet Well

SOFTWARE: page5 0203.19 START: 2002/05/17 19:12:00
EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 22:51:00
NAV FILE: brdc1370.02n OBS USED: 9108 / 9306 : 98%
ANT NAME: TRM33429.00-GP # FIXED AMB: 48 / 49 : 98%

ARP HEIGHT: 1.021 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3750)

X: -2158355.598 (m) 0.009 (m) -2158356.245 (m) 0.010 (m) Y: -4661313.460 (m) 0.010 (m) -4661312.155 (m) 0.009 (m) Z: 3769132.496 (m) 0.012 (m) 3769132.479 (m) 0.012 (m)

LAT: 36 27 11.93793 0.014(m) 36 27 11.95506 0.015(m)
E LON: 245 9 15.00605 0.004(m) 245 9 14.96046 0.007(m)
W LON: 114 50 44.99395 0.004(m) 114 50 45.03954 0.007(m)
EL HGT: 611.805(m) 0.007(m) 611.060(m) 0.007(m)

ORTHO HGT: 639.068(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4036386.571(m) EASTING: 693046.348(m)

SPC: Zone 2701 (NV) NORTHING: 8189219.653 (m) EASTING: 266107.159 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 45018

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 170325

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 157189

NEAREST NGS PUBLISHED CONTROL POINT

GR0643 B 1 N362716 W1145039 195

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: ldsq1340.020 TIME: 00:44:33 UTC

LDS Gage

SOFTWARE: page5 0203.19 START: 2002/05/14 17:58:00
EPHEMERIS: igs11662.eph [precise] STOP: 2002/05/14 21:24:00
NAV FILE: brdc1340.02n OBS USED: 7792 / 8875 : 88%
ANT NAME: TRM39105.00 # FIXED AMB: 51 / 54 : 94%

ARP HEIGHT: 2.045 OVERALL RMS: 0.020(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3666)

X: -2140313.027 (m) 0.013 (m) -2140313.673 (m) 0.013 (m) Y: -4650051.452 (m) 0.025 (m) -4650050.149 (m) 0.025 (m) Z: 3792916.802 (m) 0.002 (m) 3792916.786 (m) 0.003 (m)

LAT: 36 43 15.35091 0.019(m)36 43 15.36821 0.019(m)E LON: 245 17 4.05180 0.005(m)245 17 4.00620 0.006(m)W LON: 114 42 55.94820 0.005(m) 114 42 55.99380 0.006(m)0.021(m)EL HGT: 505.831 (m) 0.021 (m) 505.089 (m)

ORTHO HGT: 532.642(m) 0.033(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4066347.663(m) EASTING: 704018.131(m)

SPC: Zone 2701(NV) NORTHING: 8219012.081(m) EASTING: 277518.107(m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75517

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 138510

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 179674

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 635

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: ivrf1340.020 TIME: 00:45:56 UTC

Iverson Flume

SOFTWARE: page5 0203.19 START: 2002/05/14 18:19:00 EPHEMERIS: igs11662.eph [precise] STOP: 2002/05/14 21:32:00 NAV FILE: brdc1340.02n OBS USED: 6548 / 8503 : 77% ANT NAME: TRM33429.00-GP # FIXED AMB: 56 / 88 : 64%

ARP HEIGHT: 2.064 OVERALL RMS: 0.031(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3667)

X: -2140100.670 (m) 0.040 (m) -2140101.316 (m) 0.039 (m) Y: -4650849.449 (m) 0.039 (m) -4650848.146 (m) 0.039 (m) Z: 3792063.111 (m) 0.035 (m) 3792063.095 (m) 0.035 (m)

LAT: 36 42 40.81624 0.043(m) 36 42 40.83353 0.044(m) E LON: 245 17 25.26635 0.045(m) 245 17 25.22076 0.056(m) W LON: 114 42 34.73365 0.045(m) 114 42 34.77924 0.056(m) EL HGT: 505.380(m) 0.020(m) 504.638(m) 0.020(m)

ORTHO HGT: 532.232(m) 0.032(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4065295.862(m) EASTING: 704569.942(m)

SPC: Zone 2701 (NV)
NORTHING: 8217952.382 (m)
EASTING: 278054.227 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 74945

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139381

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178493

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144235 1521

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: lew21350.020 TIME: 00:48:11 UTC

Lewis-2M

SOFTWARE: page5 0203.19 START: 2002/05/15 18:00:00 EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 20:33:00 NAV FILE: brdc1350.02n OBS USED: 6413 / 6884 : 93% ANT NAME: TRM39105.00 # FIXED AMB: 39 / 43 : 91%

ARP HEIGHT: 1.576 OVERALL RMS: 0.018(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3693)

LAT: 36 44 7.67514 0.029(m) 36 44 7.69242 0.030(m)
E LON: 245 15 57.92994 0.005(m) 245 15 57.88431 0.007(m)
W LON: 114 44 2.07006 0.005(m) 114 44 2.11569 0.007(m)
EL HGT: 529.668(m) 0.030(m) 528.927(m) 0.030(m)

ORTHO HGT: 556.398(m) 0.039(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4067921.338(m) EASTING: 702339.403(m)

SPC: Zone 2701 (NV)
NORTHING: 8220610.200 (m)
EASTING: 275863.069 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75949

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 137450

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 181753

NEAREST NGS PUBLISHED CONTROL POINT

GR0791 N 301 N364418 W1144420 547

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: ldse1360.020 TIME: 00:49:18 UTC

LDS East

SOFTWARE: page5 0203.19 START: 2002/05/16 16:39:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 18:48:00 NAV FILE: brdc1360.02n OBS USED: 4462 / 4699 : 95% ANT NAME: TRM39105.00 # FIXED AMB: 29 / 31 : 94%

ARP HEIGHT: 2.045 OVERALL RMS: 0.020(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3719)

X: -2139830.827 (m) 0.012 (m) -2139831.473 (m) 0.011 (m) Y: -4650119.731 (m) 0.041 (m) -4650118.428 (m) 0.041 (m) Z: 3793106.491 (m) 0.028 (m) 3793106.474 (m) 0.028 (m)

LAT: 36 43 22.98995 0.028(m) 36 43 23.00722 0.028(m)
E LON: 245 17 22.85263 0.007(m) 245 17 22.80702 0.009(m)
W LON: 114 42 37.14737 0.007(m) 114 42 37.19298 0.009(m)
EL HGT: 507.381(m) 0.045(m) 506.639(m) 0.045(m)

ORTHO HGT: 534.195(m) 0.051(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4066594.241(m) EASTING: 704478.975(m)

SPC: Zone 2701 (NV)
NORTHING: 8219251.782 (m)
EASTING: 277982.483 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75976

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 138151

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 179736

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 218

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: lewo1353.020 TIME: 00:52:44 UTC

Lewis 1 (Old)

SOFTWARE: page5 0203.19 START: 2002/05/15 21:19:00 EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 23:18:00 NAV FILE: brdc1350.02n OBS USED: 5208 / 5417 : 96% ANT NAME: TRM33429.00-GP # FIXED AMB: 34 / 42 : 81%

ARP HEIGHT: 2.064 OVERALL RMS: 0.017 (m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3697)

X: -2141561.502 (m) 0.012 (m) -2141562.148 (m) 0.011 (m) Y: -4648229.717 (m) 0.084 (m) -4648228.414 (m) 0.084 (m) Z: 3794476.074 (m) 0.066 (m) 3794476.058 (m) 0.066 (m)

LAT: 36 44 17.85803 0.022(m)36 44 17.87532 0.023(m)E LON: 245 15 47.64524 0.031(m)245 15 47.59962 0.041(m)W LON: 114 44 12.35476 0.031(m) 114 44 12.40038 0.041(m)529.935 (m) 0.102(m)EL HGT: 530.676(m) 0.101(m)

ORTHO HGT: 557.392(m) 0.105(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4068229.143(m) EASTING: 702076.857(m)

SPC: Zone 2701 (NV)
NORTHING: 8220921.815 (m)
EASTING: 275605.140 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 76076

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 137228

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 182136

NEAREST NGS PUBLISHED CONTROL POINT

GR0791 N 301 N364418 W1144420 190

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: ldsw1351.020 TIME: 00:53:35 UTC

LDS West

SOFTWARE: page5 0203.19 START: 2002/05/15 19:00:00
EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 21:07:00

NAV FILE: brdc1350.02n OBS USED: 5917 / 5978 : 99%
ANT NAME: TRM33429.00-GP # FIXED AMB: 35 / 40 : 88%

ARP HEIGHT: 2.064 OVERALL RMS: 0.017 (m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3694)

X: -2141266.696 (m) 0.022 (m) -2141267.342 (m) 0.021 (m) Y: -4649124.419 (m) 0.064 (m) -4649123.116 (m) 0.064 (m) Z: 3793541.436 (m) 0.056 (m) 3793541.419 (m) 0.057 (m)

LAT: 36 43 40.18810 0.023(m) 36 43 40.20538 0.024(m)
E LON: 245 16 13.52206 0.013(m) 245 16 13.47646 0.016(m)
W LON: 114 43 46.47794 0.013(m) 114 43 46.52354 0.016(m)
EL HGT: 524.093(m) 0.087(m) 523.351(m) 0.088(m)

ORTHO HGT: 550.854(m) 0.091(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4067083.341(m) EASTING: 702746.277(m)

SPC: Zone 2701 (NV) NORTHING: 8219766.389 (m) EASTING: 276257.447 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75451

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 138143

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 180824

NEAREST NGS PUBLISHED CONTROL POINT

GR0790 M 301 N364354 W1144329 608

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mir11430.020 TIME: 00:56:51 UTC

GV-Mirant1 (Mirant-1)

SOFTWARE: page5 0203.19 START: 2002/05/23 20:12:00
EPHEMERIS: igs11674.eph [precise] STOP: 2002/05/23 22:25:00
NAV FILE: brdc1430.02n OBS USED: 5810 / 5918 : 98%
ANT NAME: TRM33429.00+GP # FIXED AMB: 37 / 38 : 97%

ARP HEIGHT: 2.064 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3915)

X: -2168454.645 (m) 0.004 (m) -2168455.292 (m) 0.004 (m) Y: -4659274.685 (m) 0.006 (m) -4659273.380 (m) 0.006 (m) Z: 3766119.393 (m) 0.014 (m) 3766119.375 (m) 0.015 (m)

LAT: 36 25 7.00524 0.011(m) 36 25 7.02230 0.011(m) E LON: 245 2 32.80670 0.001(m) 245 2 32.76108 0.001(m) W LON: 114 57 27.19330 0.001(m) 114 57 27.23892 0.001(m) EL HGT: 755.594(m) 0.009(m) 754.851(m) 0.009(m)

ORTHO HGT: 782.687(m) 0.027(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4032318.450(m) EASTING: 683114.606(m)

SPC: Zone 2701 (NV) NORTHING: 8185298.227 (m) EASTING: 256117.624 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 35614

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 177203

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 158816

NEAREST NGS PUBLISHED CONTROL POINT

GR1892 BIBLE N362524 W1145540 2718

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: lewn1350.020 TIME: 00:57:21 UTC

Lewis North

SOFTWARE: page5 0203.19 START: 2002/05/15 17:40:00 EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 20:29:00 NAV FILE: brdc1350.02n OBS USED: 7397 / 7612 : 97% ANT NAME: TRM39105.00 # FIXED AMB: 36 / 44 : 82%

ARP HEIGHT: 1.219 OVERALL RMS: 0.018(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3693)

X: -2142100.691 (m) 0.015 (m) -2142101.338 (m) 0.015 (m) Y: -4648213.333 (m) 0.033 (m) -4648212.030 (m) 0.034 (m) 0.018 (m) 0.019 (m)

LAT: 36 44 6.63976 0.026(m) 36 44 6.65703 0.027(m)
E LON: 245 15 27.63280 0.009(m) 245 15 27.58716 0.012(m)
W LON: 114 44 32.36720 0.009(m) 114 44 32.41284 0.012(m)
EL HGT: 535.551(m) 0.031(m) 534.809(m) 0.032(m)

ORTHO HGT: 562.267(m) 0.040(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4067871.671(m) EASTING: 701588.590(m)

SPC: Zone 2701 (NV)
NORTHING: 8220571.653 (m)
EASTING: 275111.703 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75517

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 137708

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 181986

NEAREST NGS PUBLISHED CONTROL POINT

GR0791 N 301 N364418 W1144420 466

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mw201370.020 TIME: 01:00:58 UTC

GV-PW-MW-2 (MW-2)

SOFTWARE: page5 0203.19 START: 2002/05/17 20:00:00
EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 23:10:00

NAV FILE: brdc1370.02n OBS USED: 7665 / 7724 : 99%
ANT NAME: TRM33429.00-GP # FIXED AMB: 44 / 45 : 98%

ARP HEIGHT: 1.436 OVERALL RMS: 0.017(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3751)

X: -2169090.539 (m) 0.006 (m) -2169091.186 (m) 0.006 (m) Y: -4659504.116 (m) 0.008 (m) -4659502.811 (m) 0.008 (m) Z: 3765451.633 (m) 0.028 (m) 3765451.616 (m) 0.028 (m)

LAT: 36 24 40.40116 0.017(m) 36 24 40.41824 0.018(m)
E LON: 245 2 13.55506 0.006(m) 245 2 13.50942 0.009(m)
W LON: 114 57 46.44494 0.006(m) 114 57 46.49058 0.009(m)
EL HGT: 742.524(m) 0.023(m) 741.782(m) 0.023(m)

ORTHO HGT: 769.627(m) 0.034(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4031488.438(m) EASTING: 682652.414(m)

SPC: Zone 2701 (NV)
NORTHING: 8184475.152 (m)
EASTING: 255643.329 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 34669

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 178138

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 158373

NEAREST NGS PUBLISHED CONTROL POINT

GR1892 BIBLE N362524 W1145540 3423

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: lews1351.020 TIME: 01:01:01 UTC

Lewis South

 SOFTWARE: page5
 0203.19
 START: 2002/05/15
 18:40:00

 EPHEMERIS: igs11663.eph [precise]
 STOP: 2002/05/15
 21:09:00

 NAV FILE: brdc1350.02n
 OBS USED: 6044 / 6798 : 89%

 ANT NAME: TRM33429.00-GP
 # FIXED AMB: 28 / 32 : 88%

ARP HEIGHT: 2.064 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3694)

X: -2141225.445 (m) 0.013 (m) -2141226.091 (m) 0.013 (m) Y: -4649023.345 (m) 0.028 (m) -4649022.042 (m) 0.028 (m) Z: 3793688.036 (m) 0.004 (m) 3793688.020 (m) 0.004 (m)

LAT: 36 43 46.11508 0.017(m) 36 43 46.13238 0.018(m)
E LON: 245 16 13.32804 0.006(m) 245 16 13.28242 0.008(m)
W LON: 114 43 46.67196 0.006(m) 114 43 46.71758 0.008(m)
EL HGT: 524.353(m) 0.025(m) 523.612(m) 0.025(m)

ORTHO HGT: 551.110(m) 0.035(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4067265.899(m) EASTING: 702737.133(m)

SPC: Zone 2701 (NV)
NORTHING: 8219949.037 (m)
EASTING: 276251.005 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75601

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 137970

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 180997

NEAREST NGS PUBLISHED CONTROL POINT

GR0790 M 301 N364354 W1144329 501

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: m3001431.020 TIME: 01:04:26 UTC

Paiutes M-3 (M-3)

SOFTWARE: page5 0203.19 START: 2002/05/23 19:37:00 EPHEMERIS: igs11674.eph [precise] STOP: 2002/05/23 21:47:00 NAV FILE: brdc1430.02n OBS USED: 5920 / 6027 : 98% ANT NAME: TRM33429.00-GP # FIXED AMB: 39 / 39 : 100%

ARP HEIGHT: 0.887 OVERALL RMS: 0.014(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3914)

X: -2157594.191(m) 0.007(m) -2157594.838(m) 0.008(m) Y: -4656496.193(m) 0.012(m) -4656494.890(m) 0.012(m) Z: 3775547.410(m) 0.016(m) 3775547.393(m) 0.016(m)

LAT: 36 31 29.72946 0.021(m) 36 31 29.74660 0.022(m) E LON: 245 8 21.42387 0.002(m) 245 8 21.37827 0.003(m) W LON: 114 51 38.57613 0.002(m) 114 51 38.62173 0.003(m) EL HGT: 655.026(m) 0.003(m) 654.284(m) 0.003(m)

ORTHO HGT: 682.048(m) 0.025(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4044301.604(m) EASTING: 691535.851(m)

SPC: Zone 2701(NV)
NORTHING: 8197155.231(m)
EASTING: 264713.396(m)

BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 50260

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 163187

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 164861

NEAREST NGS PUBLISHED CONTROL POINT

GR1894 T17 16S R63 64E SECS 7 12 36 C N362929 W1145301 4258

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mw101370.020 TIME: 01:09:13 UTC

GV-PW-MW1 (MW-1)

SOFTWARE: page5 0203.19 START: 2002/05/17 19:13:00
EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 23:02:00

NAV FILE: brdc1370.02n OBS USED: 9436 / 9844 : 96%
ANT NAME: TRM39105.00 # FIXED AMB: 53 / 55 : 96%

ARP HEIGHT: 2.045 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3750)

X: -2168295.326 (m) 0.008 (m) -2168295.973 (m) 0.007 (m) Y: -4659721.218 (m) 0.023 (m) -4659719.914 (m) 0.024 (m) Z: 3765627.982 (m) 0.033 (m) 3765627.965 (m) 0.033 (m)

LAT: 36 24 47.67587 0.012(m) 36 24 47.69295 0.012(m)
E LON: 245 2 46.16525 0.003(m) 245 2 46.11964 0.005(m)
W LON: 114 57 13.83475 0.003(m) 114 57 13.88036 0.005(m)
EL HGT: 735.567(m) 0.039(m) 734.824(m) 0.039(m)

ORTHO HGT: 762.691(m) 0.046(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4031729.816(m) EASTING: 683459.964(m)

SPC: Zone 2701 (NV)
NORTHING: 8184704.630 (m)
EASTING: 256454.276 (m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 35335

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 177649

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 158134

NEAREST NGS PUBLISHED CONTROL POINT

GR1892 BIBLE N362524 W1145540 2591

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mx401361.020 TIME: 01:13:42 UTC

MX-4 (CE-DT-4)

SOFTWARE: page5 0203.19 START: 2002/05/16 20:49:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 22:58:00 NAV FILE: brdc1360.02n OBS USED: 5770 / 5979 : 97% ANT NAME: TRM39105.00 # FIXED AMB: 34 / 34 : 100%

ARP HEIGHT: 2.045 OVERALL RMS: 0.015(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3724)

X: -2152643.325 (m) 0.009 (m) -2152643.972 (m) 0.010 (m) Y: -4638999.952 (m) 0.029 (m) -4638998.651 (m) 0.029 (m) Z: 3799640.438 (m) 0.037 (m) 3799640.422 (m) 0.038 (m)

LAT: 36 47 44.40893 0.017(m) 36 47 44.42617 0.018(m)
E LON: 245 6 25.92873 0.005(m) 245 6 25.88296 0.007(m)
W LON: 114 53 34.07127 0.005(m) 114 53 34.11704 0.007(m)
EL HGT: 636.506(m) 0.041(m) 635.770(m) 0.041(m)

ORTHO HGT: 662.935(m) 0.048(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4074276.921(m) EASTING: 688003.169(m)

SPC: Zone 2701 (NV)
NORTHING: 8227176.614 (m)
EASTING: 261624.086 (m)

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 178383
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 75506
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 136218

NEAREST NGS PUBLISHED CONTROL POINT

GR0799 W 301 N364736 W1145120 3330

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mx601360.020 TIME: 01:17:36 UTC

MX-6 (CE-DT-6)

SOFTWARE: page5 0203.19 START: 2002/05/16 19:59:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 22:00:00 NAV FILE: brdc1360.02n OBS USED: 5737 / 5804 : 99% ANT NAME: TRM33429.00+GP # FIXED AMB: 31 / 31 : 100%

ARP HEIGHT: 2.673 OVERALL RMS: 0.014(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3723)

X: -2144894.758 (m) 0.019 (m) -2144895.405 (m) 0.021 (m) Y: -4644665.918 (m) 0.015 (m) -4644664.616 (m) 0.015 (m) Z: 3797168.942 (m) 0.022 (m) 3797168.926 (m) 0.023 (m)

LAT: 36 46 3.55722 0.016(m) 36 46 3.57449 0.017(m) E LON: 245 12 45.46357 0.013(m) 245 12 45.41786 0.019(m) W LON: 114 47 14.53643 0.013(m) 114 47 14.58214 0.019(m) EL HGT: 667.757(m) 0.024(m) 667.018(m) 0.024(m)

ORTHO HGT: 694.315(m) 0.035(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4071381.164(m) EASTING: 697482.445(m)

SPC: Zone 2701 (NV) NORTHING: 8224141.092 (m) EASTING: 271058.457 (m)

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 184975
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 76597
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 135593

NEAREST NGS PUBLISHED CONTROL POINT

GR0795 S 301 N364622 W1144722 600

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: mx501361.020 TIME: 01:20:15 UTC

MX-5 (CE-DT-5)

SOFTWARE: page5 0203.19 START: 2002/05/16 20:21:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 21:37:00 NAV FILE: brdc1360.02n OBS USED: 3596 / 3672 : 98% ANT NAME: TRM39105.00 # FIXED AMB: 28 / 28 : 100%

ARP HEIGHT: 2.045 OVERALL RMS: 0.014(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3723)

X: -2152585.911 (m) 0.013 (m) -2152586.559 (m) 0.012 (m) Y: -4639065.209 (m) 0.010 (m) -4639063.908 (m) 0.010 (m) Z: 3799592.527 (m) 0.029 (m) 3799592.512 (m) 0.030 (m)

LAT: 36 47 42.48393 0.018(m) 36 47 42.50117 0.018(m)
E LON: 245 6 29.13707 0.011(m) 245 6 29.09128 0.013(m)
W LON: 114 53 30.86293 0.011(m) 114 53 30.90872 0.013(m)
EL HGT: 635.860(m) 0.027(m) 635.124(m) 0.027(m)

ORTHO HGT: 662.290(m) 0.037(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4074219.346(m) EASTING: 688084.000(m)

SPC: Zone 2701 (NV)
NORTHING: 8227117.853 (m)
EASTING: 261704.048 (m)

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 178468
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 75479
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 136240

NEAREST NGS PUBLISHED CONTROL POINT

GR0799 W 301 N364736 W1145120 3247

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: onc21440.02o TIME: 01:21:13 UTC

BM-ONCO-2 (ONCO-2)

SOFTWARE: page5 0203.19 START: 2002/05/24 17:36:00
EPHEMERIS: igs11675.eph [precise] STOP: 2002/05/24 19:46:00

NAV FILE: brdc1440.02n OBS USED: 5202 / 5365 : 97%

ANT NAME: TRM33429.00-GP # FIXED AMB: 33 / 35 : 94%

ARP HEIGHT: 2.064 OVERALL RMS: 0.017 (m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3939)

X: -2157138.438 (m) 0.009 (m) -2157139.084 (m) 0.009 (m) Y: -4678757.497 (m) 0.034 (m) -4678756.190 (m) 0.034 (m) Z: 3748298.109 (m) 0.016 (m) 3748298.089 (m) 0.016 (m)

LAT: 36 13 12.93647 0.021(m) 36 13 12.95351 0.022(m)
E LON: 245 14 52.66709 0.006(m) 245 14 52.62169 0.008(m)
W LON: 114 45 7.33291 0.006(m) 114 45 7.37831 0.008(m)
EL HGT: 611.757(m) 0.031(m) 611.006(m) 0.031(m)

ORTHO HGT: 639.523(m) 0.040(m) [Geoid99 NAVD88]

UTM: Zone 11

NORTHING: 4010721.806(m)

EASTING: 702054.456(m)

SPC: Zone 2701 (NV)
NORTHING: 8163428.702 (m)
EASTING: 274737.094 (m)

BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 40089

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 193105

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 130460

NEAREST NGS PUBLISHED CONTROL POINT

GR0458 P 168 N361320 W1144439 740

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: npc21361.020 TIME: 01:24:26 UTC

CSV-RW2 (CSV-NPC)

SOFTWARE: page5 0203.19 START: 2002/05/16 21:01:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 23:09:00 NAV FILE: brdc1360.02n OBS USED: 5803 / 5867 : 99% ANT NAME: TRM33429.00-GP # FIXED AMB: 39 / 39 : 100%

ARP HEIGHT: 1.743 OVERALL RMS: 0.015(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3724)

LAT: 36 47 38.19049 0.018(m) 36 47 38.20773 0.019(m)
E LON: 245 6 20.07327 0.006(m) 245 6 20.02750 0.008(m)
W LON: 114 53 39.92673 0.006(m) 114 53 39.97250 0.008(m)
EL HGT: 644.149(m) 0.044(m) 643.413(m) 0.044(m)

ORTHO HGT: 670.579(m) 0.051(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4074082.073(m) EASTING: 687862.254(m)

SPC: Zone 2701 (NV)
NORTHING: 8226983.892 (m)
EASTING: 261480.312 (m)

### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
AI8811 rail RAILROAD VALLEY CORS ARP N381649 W1153953 178506
AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 75275
AI8817 echo ECHO CANYON S.P. CORS ARP N375455 W1141551 136452

NEAREST NGS PUBLISHED CONTROL POINT

GR0799 W 301 N364736 W1145120 3466

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: plby1340.020 TIME: 01:25:08 UTC

Playboy Pool Gage (Perderson East Gage)

SOFTWARE: page5 0203.19 START: 2002/05/14 19:04:00 EPHEMERIS: igs11662.eph [precise] STOP: 2002/05/14 21:12:00 NAV FILE: brdc1340.02n OBS USED: 5374 / 5858 : 92% ANT NAME: TRM33429.00-GP # FIXED AMB: 42 / 44 : 95%

ARP HEIGHT: 0.911 OVERALL RMS: 0.019(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3667)

X: -2140653.456 (m) 0.026 (m) -2140654.102 (m) 0.026 (m) Y: -4650756.348 (m) 0.055 (m) -4650755.045 (m) 0.055 (m) Z: 3791897.993 (m) 0.033 (m) 3791897.976 (m) 0.034 (m)

LAT: 36 42 33.68121 0.025(m) 36 42 33.69847 0.025(m)
E LON: 245 17 3.46692 0.006(m) 245 17 3.42133 0.008(m)
W LON: 114 42 56.53308 0.006(m) 114 42 56.57867 0.008(m)
EL HGT: 524.144(m) 0.059(m) 523.402(m) 0.060(m)

ORTHO HGT: 550.989(m) 0.064(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4065063.042(m) EASTING: 704034.246(m)

SPC: Zone 2701 (NV) NORTHING: 8217727.540 (m) EASTING: 277515.223 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 74454

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139745

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178472

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 1801

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: pedg1361.020 TIME: 01:28:15 UTC

Pederson Spring Gage

SOFTWARE: page5 0203.19 START: 2002/05/16 18:15:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 21:39:00 NAV FILE: brdc1360.02n OBS USED: 7290 / 9325 : 78% ANT NAME: TRM33429.00-GP # FIXED AMB: 52 / 65 : 80%

ARP HEIGHT: 2.135 OVERALL RMS: 0.029(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3721)

X: -2140670.488 (m) 0.070 (m) -2140671.135 (m) 0.071 (m) Y: -4650732.165 (m) 0.088 (m) -4650730.862 (m) 0.088 (m) 0.056 (m)

LAT: 36 42 34.52745 0.034(m) 36 42 34.54473 0.035(m)
E LON: 245 17 2.43623 0.027(m) 245 17 2.39060 0.035(m)
W LON: 114 42 57.56377 0.027(m) 114 42 57.60940 0.035(m)
EL HGT: 525.078(m) 0.110(m) 524.336(m) 0.110(m)

ORTHO HGT: 551.922(m) 0.113(m) [Geoid99 NAVD88]

UTM: Zone 11

NORTHING: 4065088.514(m)

EASTING: 704008.048(m)

SPC: Zone 2701 (NV)
NORTHING: 8217753.393 (m)
EASTING: 277489.407 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 74460

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139728

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178506

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 1783

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: prko1351.020 TIME: 01:29:08 UTC

Perkins Old well

SOFTWARE: page5 0203.19 START: 2002/05/15 20:59:00 EPHEMERIS: igs11663.eph [precise] STOP: 2002/05/15 22:30:00 NAV FILE: brdc1350.02n OBS USED: 4054 / 4168 : 97% ANT NAME: TRM39105.00 # FIXED AMB: 30 / 31 : 97%

ARP HEIGHT: 2.347 OVERALL RMS: 0.017(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3696)

X: -2139155.575 (m) 0.018 (m) -2139156.221 (m) 0.018 (m) Y: -4651343.953 (m) 0.083 (m) -4651342.650 (m) 0.083 (m) Z: 3791981.288 (m) 0.051 (m) 3791981.271 (m) 0.052 (m)

LAT: 36 42 37.63618 0.025(m) 36 42 37.65346 0.026(m)
E LON: 245 18 8.18482 0.023(m) 245 18 8.13923 0.030(m)
W LON: 114 41 51.81518 0.023(m) 114 41 51.86077 0.030(m)
EL HGT: 499.973(m) 0.090(m) 499.230(m) 0.090(m)

ORTHO HGT: 526.851(m) 0.093(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4065223.380(m) EASTING: 705637.294(m)

SPC: Zone 2701 (NV)
NORTHING: 8217864.137 (m)
EASTING: 279120.240 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 75487

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139180

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178041

NEAREST NGS PUBLISHED CONTROL POINT

GR0789 K 301 N364305 W1144133 966

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: rw1h1430.02o TIME: 01:31:47 UTC

GV-RW1(RW-1)(Harvey Replacement Well)

SOFTWARE: page5 0203.19 START: 2002/05/23 18:06:00 EPHEMERIS: igs11674.eph [precise] STOP: 2002/05/23 20:52:00 NAV FILE: brdc1430.02n OBS USED: 7701 / 7874 : 98% ANT NAME: TRM39105.00 # FIXED AMB: 42 / 44 : 95%

ARP HEIGHT: 1.216 OVERALL RMS: 0.015(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3913)

X: -2158389.874 (m) 0.007 (m) -2158390.521 (m) 0.007 (m) Y: -4661118.976 (m) 0.008 (m) -4661117.671 (m) 0.008 (m) Z: 3769337.810 (m) 0.010 (m) 3769337.792 (m) 0.010 (m)

LAT: 36 27 20.41890 0.013(m) 36 27 20.43601 0.014(m) E LON: 245 9 10.47561 0.005(m) 245 9 10.43002 0.006(m) W LON: 114 50 49.52439 0.005(m) 114 50 49.56998 0.006(m) EL HGT: 603.433(m) 0.002(m) 602.689(m) 0.002(m)

ORTHO HGT: 630.691(m) 0.025(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4036645.421(m) EASTING: 692927.717(m)

SPC: Zone 2701(NV)
NORTHING: 8189480.191(m)
EASTING: 265992.358(m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 45130

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 170110

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 157473

NEAREST NGS PUBLISHED CONTROL POINT

GR1882 DRY LAKE UNION PACIFIC TANK N362717 W1145043 194

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: th201431.020 TIME: 01:33:23 UTC

Paiutes TH-2 (TH-2)

SOFTWARE: page5 0203.19 START: 2002/05/23 18:09:00 EPHEMERIS: igs11674.eph [precise] STOP: 2002/05/23 23:03:00 NAV FILE: brdc1430.02n OBS USED: 12927 / 13474 : 96% ANT NAME: TRM33429.00-GP # FIXED AMB: 53 / 57 : 93%

ARP HEIGHT: 0.853 OVERALL RMS: 0.017(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3914)

X: -2150541.937 (m) 0.004 (m) -2150542.584 (m) 0.005 (m) Y: -4656194.328 (m) 0.014 (m) -4656193.024 (m) 0.014 (m) Z: 3779963.900 (m) 0.012 (m) 3779963.882 (m) 0.012 (m)

LAT: 36 34 27.30830 0.018(m) 36 34 27.32547 0.019(m)
E LON: 245 12 33.65615 0.002(m) 245 12 33.61052 0.002(m)
W LON: 114 47 26.34385 0.002(m) 114 47 26.38948 0.002(m)
EL HGT: 686.378(m) 0.005(m) 685.635(m) 0.005(m)

ORTHO HGT: 713.411(m) 0.025(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4049916.210(m) EASTING: 697684.077(m)

SPC: Zone 2701 (NV)
NORTHING: 8202678.053 (m)
EASTING: 270942.977 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 58415

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 156041

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 167101

NEAREST NGS PUBLISHED CONTROL POINT

GR1907 QUARRY N363456 W1144715 931

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: shv11371.020 TIME: 01:36:06 UTC

SHV-1

SOFTWARE: page5 0203.19 START: 2002/05/17 21:07:00 EPHEMERIS: igs11665.eph [precise] STOP: 2002/05/17 23:37:00 NAV FILE: brdc1370.02n OBS USED: 6180 / 6383 : 97% ANT NAME: TRM39105.00 # FIXED AMB: 42 / 44 : 95%

ARP HEIGHT: 2.045 OVERALL RMS: 0.019(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3752)

X: -2162052.736 (m) 0.004 (m) -2162053.382 (m) 0.004 (m) Y: -4652517.196 (m) 0.012 (m) -4652515.893 (m) 0.012 (m) Z: 3778097.414 (m) 0.019 (m) 3778097.397 (m) 0.020 (m)

LAT: 36 33 9.65012 0.017(m) 36 33 9.66725 0.018(m) E LON: 245 4 31.52386 0.001(m) 245 4 31.47822 0.002(m) W LON: 114 55 28.47614 0.001(m) 114 55 28.52178 0.002(m) EL HGT: 781.107(m) 0.015(m) 780.367(m) 0.016(m)

ORTHO HGT: 807.817(m) 0.029(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4047255.756(m) EASTING: 685751.009(m)

SPC: Zone 2701 (NV)
NORTHING: 8200193.976 (m)
EASTING: 258973.210 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 49778

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 162234

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 170239

NEAREST NGS PUBLISHED CONTROL POINT

GR1788 DRY N363032 W1145529 4875

USER: timothy.wolf\@lvvwd.com DATE: June 20, 2002 RINEX FILE: wrmg1360.020 TIME: 01:37:22 UTC

Warm Springs West Gage

SOFTWARE: page5 0203.19 START: 2002/05/16 17:09:00 EPHEMERIS: igs11664.eph [precise] STOP: 2002/05/16 21:33:00 NAV FILE: brdc1360.02n OBS USED: 10092 / 11071 : 91% ANT NAME: TRM33429.00-GP # FIXED AMB: 60 / 62 : 97%

ARP HEIGHT: 1.564 OVERALL RMS: 0.022(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3721)

X: -2140432.852 (m) 0.003 (m) -2140433.498 (m) 0.004 (m) Y: -4650704.288 (m) 0.002 (m) -4650702.985 (m) 0.002 (m) Z: 3792065.787 (m) 0.016 (m) 3792065.770 (m) 0.016 (m)

LAT: 36 42 40.75004 0.014(m) 36 42 40.76732 0.015(m)
E LON: 245 17 10.66370 0.002(m) 245 17 10.61810 0.004(m)
W LON: 114 42 49.33630 0.002(m) 114 42 49.38190 0.004(m)
EL HGT: 512.593(m) 0.007(m) 511.851(m) 0.007(m)

ORTHO HGT: 539.437(m) 0.026(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4065285.166(m) EASTING: 704207.635(m)

SPC: Zone 2701 (NV)
NORTHING: 8217947.045 (m)
EASTING: 277691.852 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 74735

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 139486

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178615

NEAREST NGS PUBLISHED CONTROL POINT

GR1414 L 301 N364330 W1144238 1549

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002

RINEX FILE: abbt1961.020 TIME: 15:19:08 UTC

Abbott (UM7)

SOFTWARE: page5 0203.19 ./master.pl START: 2002/07/15 17:32:00
EPHEMERIS: igs11751.eph [precise] STOP: 2002/07/15 19:39:00

NAV FILE: brdc1960.02n OBS USED: 4608 / 4943 : 93%
ANT NAME: TRM33429.00+GP # FIXED AMB: 39 / 47 : 83%

ARP HEIGHT: 2.0635 OVERALL RMS: 0.015(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.5364)

X: -2138309.430 (m) 0.024 (m) -2138310.079 (m) 0.025 (m)
Y: -4651456.426 (m) 0.058 (m) -4651455.123 (m) 0.058 (m)
Z: 3792309.916 (m) 0.042 (m) 3792309.898 (m) 0.042 (m)

LAT: 36 42 51.05475 0.023(m) 36 42 51.07197 0.024(m)
E LON: 245 18 41.05148 0.010(m) 245 18 41.00579 0.012(m)
W LON: 114 41 18.94852 0.010(m) 114 41 18.99421 0.012(m)
EL HGT: 494.975(m) 0.072(m) 494.233(m) 0.072(m)

ORTHO HGT: 521.857(m) 0.077(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4065656.587 (m) EASTING: 706442.894 (m)

SPC: Zone 2701 (NV)
NORTHING: 8218285.322 (m)
EASTING: 279932.039 (m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 76303

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 138560

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 178159

NEAREST NGS PUBLISHED CONTROL POINT

GR0789 K 301 N364305 W1144133 554

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002 TIME: 15:49:33 UTC

RINEX FILE: ecp21911.020

Paiutes ECP2 (ECP-2)

SOFTWARE: page5 0203.19 ./master2.pl

START: 2002/07/10 17:49:00

EPHEMERIS: igs11743.eph [precise] STOP: 2002/07/10 22:35:00 NAV FILE: brdc1910.02n OBS USED: 8968 / 9276 : 97% ANT NAME: TRM33429.00+GP # FIXED AMB: 50 / 52 : 96%

ARP HEIGHT: 1.414 OVERALL RMS: 0.020(m)

REF FRAME: NAD83 (CORS96) (EPOCH: 2002.0000) ITRF00 (EPOCH:2002.5228)

-2152255.972 (m) 0.007 (m) -2152256.621(m) 0.007(m)X: Y: -4657439.877 (m) 0.008 (m)-4657438.573 (m) 0.008 (m) 3777412.272 (m) 0.025 (m) 3777412.253 (m) 0.026(m)Z:

LAT: 36 32 45.08730 0.024(m)36 32 45.10441 0.025(m)E LON: 245 11 52.09448 0.003(m)245 11 52.04880 0.005(m)114 48 7.95120 W LON: 114 48 7.90552 0.003(m) 0.005(m)EL HGT: 652.100 (m) 0.010 (m) 651.356 (m) 0.011 (m)

ORTHO HGT: 679.194(m) 0.027(m) [Geoid99 NAVD88]

UTM: Zone 11 4046742.158 (m) NORTHING: EASTING: 696722.953(m)

SPC: Zone 2701(NV) 8199518.881 (m) NORTHING: 269935.308(m) EASTING:

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE (m) AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 55309 N375455 W1141551 AI8817 echo ECHO CANYON S.P. CORS ARP 159357 AM7015 king KINGMAN CORS ARP N351150 W1140229 164661

NEAREST NGS PUBLISHED CONTROL POINT

GR1906 PET N363133 W1144830 2296

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002 TIME: 15:53:28 UTC

RINEX FILE: ecp11910.020

Paiutes ECP-1 (ECP-1)

START: 2002/07/10 17:37:00 SOFTWARE: page5 0203.19 ./master.pl EPHEMERIS: igs11743.eph [precise] STOP: 2002/07/10 21:33:00 NAV FILE: brdc1910.02n OBS USED: 8130 / 8423 : 97%

ANT NAME: TRM39105.00 # FIXED AMB: 49 / 51 : 96%

ARP HEIGHT: 1.015 OVERALL RMS: 0.019(m)

REF FRAME: NAD83 (CORS96) (EPOCH: 2002.0000) ITRF00 (EPOCH:2002.5228)

-2152292.157 (m) -2152292.805(m) 0.013(m)X: 0.013(m)Y: -4657524.635 (m) 0.026 (m)-4657523.331 (m) 0.026 (m) 3777290.781 (m) 0.029 (m) 3777290.762(m) 0.031(m)Z:

LAT: 36 32 40.14187 0.023(m)36 32 40.15899 0.025(m)E LON: 245 11 52.20334 0.002 (m)245 11 52.15769 0.003(m)114 48 7.84231 W LON: 114 48 7.79666 0.002(m) 0.003(m)EL HGT: 653.765 (m) 0.039 (m) 653.021 (m) 0.039 (m)

ORTHO HGT: 680.863(m) 0.046(m) [Geoid99 NAVD88]

UTM: Zone 11 4046589.806(m) NORTHING: EASTING: 696729.143(m)

SPC: Zone 2701(NV) 8199366.472 (m) NORTHING: 269939.253 (m) EASTING:

BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE (m) AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 55193 N375455 W1141551 AI8817 echo ECHO CANYON S.P. CORS ARP 159501 AM7015 king KINGMAN CORS ARP N351150 W1140229 164522

NEAREST NGS PUBLISHED CONTROL POINT

GR1906 PET N363133 W1144830 2148

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002 TIME: 15:56:09 UTC

RINEX FILE: ecp31910.020

Paiutes ECP-3 (ECP-3)

SOFTWARE: page5 0203.19 ./master2.pl START: 2002/07/10 17:59:00 EPHEMERIS: igs11743.eph [precise] STOP: 2002/07/10 22:29:00

NAV FILE: brdc1910.02n OBS USED: 8201 / 8700 : 94% ANT NAME: TRM33429.00+GP # FIXED AMB: 57 / 59 : 97%

ARP HEIGHT: 1.256 OVERALL RMS: 0.020(m)

REF FRAME: NAD83(CORS96)(EPOCH:2002.0000) ITRF00 (EPOCH:2002.5228)

-2152200.399 (m)0.008(m) -2152201.048 (m) 0.009(m)Х: Y: -4657310.557 (m) 0.013 (m)-4657309.253 (m) 0.012 (m) 3777609.663(m) 0.030(m) 3777609.644(m) 0.031(m)Z:

0.026(m)LAT: 36 32 52.94914 0.025(m)36 32 52.96625 E LON: 245 11 51.94166 0.004 (m)245 11 51.89599 0.006(m)W LON: 114 48 8.05834 0.004(m) 114 48 8.10401 0.006(m) EL HGT: 655.862 (m) 0.025 (m) 656.606(m) 0.025(m)

ORTHO HGT: 683.692(m) 0.035(m) [Geoid99 NAVD88]

UTM: Zone 11 4046984.366(m) NORTHING: EASTING: 696713.616(m)

SPC: Zone 2701(NV) 8199761.171(m) NORTHING: 269929.540(m) EASTING:

#### BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE DISTANCE (m) AJ1826 lvwd LAS VEGAS VALLEY CORS ARP N360934 W1151128 55495 N375455 W1141551 AI8817 echo ECHO CANYON S.P. CORS ARP 159126 N351150 W1140229 AM7015 king KINGMAN CORS ARP 164883

NEAREST NGS PUBLISHED CONTROL POINT

GR1906 PET N363133 W1144830 2532

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002 RINEX FILE: gv201961.020 TIME: 15:57:22 UTC

GV-2

SOFTWARE: page5 0203.19 ./master.pl START: 2002/07/15 16:32:00
EPHEMERIS: igs11751.eph [precise] STOP: 2002/07/15 21:35:00
NAV FILE: brdc1960.02n OBS USED: 10459 / 10900 : 96%
ANT NAME: TRM33429.00+GP # FIXED AMB: 66 / 68 : 97%

ARP HEIGHT: 1.594 OVERALL RMS: 0.019(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.5364)

X: -2167421.242(m) 0.008(m) -2167421.891(m) 0.009(m) Y: -4664096.000(m) 0.023(m) -4664094.695(m) 0.023(m) Z: 3760704.210(m) 0.020(m) 3760704.191(m) 0.021(m)

LAT: 36 21 29.85157 0.025(m) 36 21 29.86857 0.026(m)
E LON: 245 4 31.96879 0.005(m) 245 4 31.92313 0.006(m)
W LON: 114 55 28.03121 0.005(m) 114 55 28.07687 0.006(m)
EL HGT: 711.470(m) 0.017(m) 710.726(m) 0.017(m)

ORTHO HGT: 738.815(m) 0.030(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4025689.631(m) EASTING: 686226.491(m)

SPC: Zone 2701 (NV) NORTHING: 8178624.988 (m) EASTING: 259131.664 (m)

### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 32593

 A18817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 182536

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 151563

NEAREST NGS PUBLISHED CONTROL POINT

GR0672 W 137 N362116 W1145427 1579

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002 RINEX FILE: m1001931.020 TIME: 16:00:31 UTC

Paiutes-M-1 (M-1)

SOFTWARE: page5 0203.19 ./master.pl START: 2002/07/12 17:07:00
EPHEMERIS: igs11745.eph [precise] STOP: 2002/07/12 19:18:00

NAV FILE: brdc1930.02n OBS USED: 5353 / 5463 : 98%
ANT NAME: TRM33429.00+GP # FIXED AMB: 38 / 38 : 100%

ARP HEIGHT: 1.512 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.5281)

X: -2142384.698 (m) 0.005 (m) -2142385.347 (m) 0.004 (m) Y: -4655219.099 (m) 0.010 (m) -4655217.796 (m) 0.010 (m) Z: 3785527.645 (m) 0.028 (m) 3785527.626 (m) 0.029 (m)

LAT: 36 38 15.38012 0.021(m) 36 38 15.39730 0.021(m) E LON: 245 17 15.27233 0.003(m) 245 17 15.22667 0.004(m) W LON: 114 42 44.72767 0.003(m) 114 42 44.77333 0.004(m) EL HGT: 551.476(m) 0.025(m) 550.732(m) 0.025(m)

ORTHO HGT: 578.539(m) 0.035(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4057109.142(m) EASTING: 704517.133(m)

SPC: Zone 2701 (NV)
NORTHING: 8209768.487 (m)
EASTING: 277880.490 (m)

#### BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 68277

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 147319

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 170913

NEAREST NGS PUBLISHED CONTROL POINT

GR1902 BYRON N363638 W1144128 3563

USER: timothy.wolf\@lvvwd.com DATE: August 07, 2002

RINEX FILE: m2001910.020 TIME: 16:23:53 UTC

Paiutes-M-2 (m-2)

SOFTWARE: page5 0203.19 ./master2.pl START: 2002/07/10

17:09:00

EPHEMERIS: igs11743.eph [precise] STOP: 2002/07/10

21:10:00

NAV FILE: brdc1910.02n OBS USED: 8951 / 9379

95%

ANT NAME: TRM39105.00 # FIXED AMB: 56 / 56 :

100%

ARP HEIGHT: 2.045 OVERALL RMS: 0.020(m)

REF FRAME: NAD83(CORS96)(EPOCH:2002.0000) ITRF00

(EPOCH:2002.5227)

X: -2154629.227(m) 0.011(m) -2154629.876(m)

0.011(m)

Y: -4660142.152(m) 0.022(m) -4660140.848(m)

0.022(m)

Z: 3772693.403(m) 0.028(m) 3772693.384(m)

0.029(m)

LAT: 36 29 35.49705 0.021(m) 36 29 35.51412

0.022(m)

E LON: 245 11 11.08443 0.002(m) 245 11 11.03879

0.004(m)

W LON: 114 48 48.91557 0.002(m) 114 48 48.96121

0.004 (m)

EL HGT: 615.456(m) 0.033(m) 614.712(m)

0.033(m)

ORTHO HGT: 642.681(m) 0.041(m) [Geoid99 NAVD88]

UTM: Zone 11 NORTHING: 4040875.950(m)

EASTING: 695835.903(m)

SPC: Zone 2701(NV) NORTHING: 8193667.041(m)

EASTING: 268962.113(m)

BASE STATIONS USED

 PID
 DESIGNATION
 LATITUDE
 LONGITUDE
 DISTANCE (m)

 AJ1826 lvwd LAS VEGAS VALLEY CORS ARP
 N360934 W1151128
 50223

 AI8817 echo ECHO CANYON S.P. CORS ARP
 N375455 W1141551
 165242

 AM7015 king KINGMAN CORS ARP
 N351150 W1140229
 159825

NEAREST NGS PUBLISHED CONTROL POINT

GR0650 G 161 N362853 W1144817 1535

USER: sean.corkill\@lvvwd.com DATE: October 01, 2002

RINEX FILE: onco1441.020 TIME: 18:40:15 UTC

BM-ONCO-1 (ONCO-1)

SOFTWARE: page5 0203.19 ./master2.pl START: 2002/05/24

17:08:00

EPHEMERIS: igs11675.eph [precise] STOP: 2002/05/24

19:13:00

NAV FILE: brdc1440.02n OBS USED: 5418 / 5542 :

98%

ANT NAME: TRM33429.00+GP # FIXED AMB: 33 / 37 :

89%

ARP HEIGHT: 2.063500127 OVERALL RMS: 0.016(m)

REF FRAME: NAD83(CORS96)(EPOCH:2002.0000) ITRF00

(EPOCH:2002.3939)

X: -2156589.432 (m) 0.008 (m) -2156590.080 (m)

0.008(m)

Y: -4678991.115 (m) 0.027 (m) -4678989.806 (m)

0.026(m)

Z: 3748300.406(m) 0.020(m) 3748300.386(m)

0.020(m)

LAT: 36 13 13.33539 0.016(m) 36 13 13.35245

0.016(m)

E LON: 245 15 16.54342 0.004(m) 245 15 16.49793

0.005(m)

W LON: 114 44 43.45658 0.004(m) 114 44 43.50207

0.005(m)

EL HGT: 598.855(m) 0.031(m) 598.103(m)

0.031(m)

ORTHO HGT: 626.617(m) 0.040(m) [Geoid99 NAVD88]

UTM: Zone 11

NORTHING: 4010747.950 (m)

EASTING: 702650.398 (m)

US NATIONAL GRID DESIGNATOR: 11SQA0265010748 (NAD 83)

SPC: Zone 2701 (NV)
NORTHING: 8163446.129 (m)
EASTING: 275333.275 (m)

BASE STATIONS USED

PID DESIGNATION LATITUDE LONGITUDE

DISTANCE (m)

AJ1826 LVWD LAS VEGAS VALLEY CORS ARP N360934.026 W1151128.797 40679.3 AI8817 ECHO ECHO CANYON S.P. CORS ARP N375455.904 W1141551.242 192961.5

AM7015 KING KINGMAN CORS ARP

NEAREST NGS PUBLISHED CONTROL POINT

GR0458 P 168 N361319. W1144441. 185.6